THE

ELECTRICAL REVIEW.

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ELECTRICAL REVIEW.

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NATIONAL ELECTRICITY SUPPLY.

THE proposals for the organisation of electricity supply on a national basis have been brought into the forefront by the references to this subject in the election addresses of the Prime Minister and Mr. Churchill; in our last issue we published figures issued by the Ministry of Munitions, showing the enormous increase in the output of electrical energy during the war, and in the capacity of the generating plant installed, and there is good reason for believing that the demand will continue to increase at a rapid rate. It is evident, therefore, that the formulation of a definite policy in this matter is a question of the utmost urgency, and it is to be regretted that, owing to the approaching election, it will not be possible to make any material progress with the scheme before next year. However, there is no reason why preparations should not be made in advance by the departments chiefly concerned, so that no avoidable delay shall be incurred when the time comes for Parliamentary action. The longer the matter is allowed to drift, the more difficult it will be to devise a satisfactory scheme and to remedy the defects of the existing system—or, rather, lack of system; moreover, it is desirable that definite orders for new plant shall be placed as soon as possible, not only in order that the plant may be put in operation at the earliest moment, but also to enable manufacturers to maintain and increase their production so as to provide employment for their present workpeople and those who will soon be released from their military duties.

In this connection we draw attention to the statement adopted by a number of municipalities in the North-Eastern area, an abstract of which appears elsewhere in this issue. This statement was referred to at a recent meeting, but could not be included in our report, as it had not then been submitted to the Government Departments concerned; it will be noted that while the signatories include several important local authorities, there are some notable abstentions, including Sunderland and Darlington.

While the municipalities which subscribe to this statement nominally accept the main principle of the national scheme, it is but lip-service; apparently they accept it on the condition that it leaves them where they are, and hamstrings the North-East Coast companies, towards whom the statement is instinct with jealousy and suspicion. In fact, the statement revives in the acutest form the old animosity displayed by municipalities towards companies, which elsewhere has been dying out; it exhibits the parochial spirit in its narrowest phase, and is wholly out of sympathy with the broad national view of the question which is set forth in the report of the Board of Trade Committee. Let it be granted that in the undisguised partiality of the Coal Conservation Report for company control—a most regrettable indiscretion—municipalities generally have just ground for complaint, while in the laudation of the Tyneside companies' efficiency the North-Eastern municipalities in particular see King Charles's head: after making due allowance for the influence of these factors, the residue of the statement still savours of the parish pump. Instead of a small and efficient body of five expert Commissioners, these municipalities advocate "a sufficiency of members of independent judgment and general experience," presumably another of those debating societies of which we have already far too many; the delimitation of electrical districts and the constitution of District Boards are similarly to be settled "by direct Parliamentary action after preliminary local inquiries"—the old circumlocution system, therefore, to be perpetuated; existing stations are to be free to extend their plant *ad lib.*—a condition fatal to the national scheme; municipalities are

to be allowed to make profits—a principle which Parliament long ago set its face against; no relaxation of the rating system or of the municipal veto on overhead mains is to be admitted. Thus these municipalities, situated in an area where private enterprise and initiative have had free play in expanding the use of electricity and utilising waste heat, to the great advantage of the residents in the district (the worst that they can say of the service is that the charges of the supply companies "approximate very closely to those of comparable municipal undertakings"), stand fast for the old and discredited fads of the beginning of the century, and close their eyes to the lessons of the war and the fact that the times have changed, though they have not. They do condescend to express approval of one item in the Power Supply Committee's report—the recommendation that, in the national interest, generating stations and main transmission lines should, as a general rule, be publicly owned—but they tack on to their avowal a proposal that companies generating electricity should have no representation whatever on the District Electricity Boards!

We hold no brief for either side; there should, indeed, be no "sides" in this matter, and our sole aim is to promote the best interests of the nation as a whole. That to perpetuate the existing system would be to invite disaster is generally agreed, even amongst municipal authorities—as was abundantly proved at the Conferences of the I.M.E.A. and the M.T.A. this year. But all this rhetorical declamation against companies and so-called "trusts" emphatically does not make for the public welfare; it reveals a pitifully narrow-minded spirit, and an utter inability to take a long view of this extremely important subject. That the proposals of the Board of Trade Committee are open to improvement in many respects is beyond question; but no good will be done by adopting the policy outlined in this reactionary statement.

The Coming Election.

In ordinary times this Journal has nothing to do with Politics, as that word is generally understood. But we are not living in ordinary times. In our opinion, there never has been a time when a General Election was fraught with greater possibilities for good or evil, for security or for chaos, than is that which is to be fought next month. We stand with those who are utterly sick of the Party spirit in government, and who hold that nothing is more essential for the well-being of the nation as a whole than united action for "the furtherance of the general good." We do not say this simply because we believe in either Mr. Lloyd George or Mr. Bonar Law, though we hold that without their co-operative leadership the war might have been lost to the Allies; we say it because it is necessary to have stability at the helm during what will be a vital period—indeed, a great crisis. In the manifesto which the leaders of the Coalition have issued—we observe that it is not signed by Labour representatives, presumably because Labour has by vote withdrawn them—it is stated, and surely there will be few to disagree, that the tasks directly arising out of the war "can only be surmounted by the good sense, the patriotism, and the forbearance of our people." "The unity of the nation . . . must not be relaxed if the many anxious problems . . . are to be handled with insight, courage, and promptitude" for the "furtherance of the general good." It may be possible to reduce the burden of armaments and to release, "by successive and progressive stages," the Labour and Capital of the Empire for the arts of peace. The Coalition will endeavour to further a fruitful mutual understanding between the associated peoples. Profiting by the experience of war it recognises, as industrial experts have long done, that increased production must necessarily be the basis of all schemes for the improvement of the conditions of the people. It upbraids us for our past lack of organisation or wasteful organisation, and we need not inquire now how far the culpability in that connection lies at the door of the politician. It desires to promote scientific farming in the interests of food production, and we trust that it will not cold-shoulder those who advocate electrical methods. It is pledged by this manifesto systematically to improve the transport facilities of the agricultural areas, a matter so often discussed by those who long ago saw the need for light railways. It considers it premature to prescribe a permanent fiscal policy until the country has returned to normal industrial conditions, but it recognises that one of the lessons most clearly taught by the war is the danger of being dependent upon other countries for vital supplies on which the life of the nation may depend. "It is the intention, therefore, of the Government to preserve and sustain, where necessary, these key industries in the way which experience and examination may prove to be best adapted for the purpose." Further, "if production is to be maintained at the highest limit at home security must be given against the unfair competition to which our industries may be subjected by the dumping of goods produced abroad and sold on our market below the actual cost of production." It promises the liberation of industry from Government control at the earliest possible moment. Other measures promised are "the development and control in the best interests of the State of the economical production of power and light and of the railways and the means of communication. An improvement of the Consular Service is foreshadowed, and the establishment of regular machinery for "consultation with representative trade and industrial organisations on matters affecting their interest and prosperity." In these ways output will be increased, new markets opened out, and great economies effected in industrial production. There are many other matters covered in the manifesto, but the points we have selected commend themselves to us as a journal concerned with the stability and development of British industry and anxious for the well-being of all who engage therein.

Merited Recognition.

The *argumentum ad hominem* may be the hoariest of fallacies, but its logical shortcomings have not prevented its being a determining factor in many an argumentative bout. In actual practical affairs, too, the "personal factor" is often by no means negligible. Even if matters be of the weightiest, the personal element can be trusted to crop up somewhere or other. We are reminded of this by a suggestion in the Board of Trade Electric Power Committee's Report. The wise provision in question runs as follows:—

> **Although under our proposals and the development which may be expected to flow from them, there should be new and improved openings for engineers and other officials, we think provision should be made by which District Electricity Boards may provide compensation for displaced engineers and other officials in cases of hardship.**

This cash payment by way of compensation for loss of office is just and right. But the electric supply industry is in a specially unique position, and a glance at the facts will, perhaps, suggest that certain of the engineers and others displaced by the new scheme merit a recognition that is hardly satisfied by cash alone. The unique position of the industry at the moment rests on the fact that the industry itself has been practically contemporary with the engineers and others who are now in charge of the undertakings—the industry and themselves having started life together, so to speak. This means that the development of the industry from its elementary stage, some 30 years ago, to its present assured position among the industries, is, in a great measure, due to their initiative and guidance. They have a connection and tie more intimate than a purely monetary one. There is, therefore, a certain amount of call for permanent recognition of such services, and a particularly fitting opportunity will occur when the Board of Trade scheme is put into operation. There are certain of the new Orders or Honours which have recently been constituted which might very fittingly be bestowed in this direction, as marking services rendered in developing scientifically, practically, and financially what has proved itself to be a "key," or even more than a "key," industry. If we regard the most important development of the industry as taking place, say, from 1900 or thereabouts, when the bulk of Provisional Orders were being granted, we shall find that a large proportion of the important company engineers or managers have had control of their undertakings from about that time.

The same applies proportionately to the leading municipal engineers, although in some cases here, perhaps, the engineer has changed from one undertaking to another during this period; but this, of course, does not affect the case. Returning, therefore, to the "personal factor" which we have already mentioned, it would certainly appear that the whole atmosphere which the Board of Trade scheme will bring about will be felt by all parties concerned to be the more genial if it is known that the Government is entering into negotiations in a friendly and appreciative mood towards those who have borne the "burden and heat of the day," rather than that it will come along in the *rôle* of a willy-nilly autocrat, a procedure which, in the circumstances, the scattering of largesse will not deprive of acerbity.

Work-Producing Schemes.

In pre-war years the months of November and December were a period of great activity in the depositing of Private Bills for Parliamentary consideration. Promoters had their schemes well in mind long before that time, of course, but after allowing for a fair percentage of the proposals to fall through, or to be turned down on various grounds, one could generally gauge from the lists that appeared in the *London Gazette* the probable effect upon certain departments of industry a little later. No doubt many public authorities already know what they want to do, and private parties, too, have numerous projects waiting which had to be deferred until the end of the war was at hand. If the works which have been held up can be proceeded with in a short time, they should greatly assist the nation in the work of industrial reconstruction. There is a vast amount of work in arrears for the execution of which no Parliamentary powers will be needed, but in respect of others to which this does not apply, the Chairman of Committees in the House of Lords is prepared to give them favourable consideration, though the time is later than usual. It is intimated in the *Times* that he will adopt this course in respect of late Private Bills, that is, Bills not deposited in December in accordance with Standing Orders, "for which urgency can be claimed owing to the Armistice and the prospect of Peace." Those who are directly interested in this matter should make application early in the new Parliament for leave to introduce their Bills, thus giving due time for their consideration.

The Patent Laws.

In this issue we conclude a full abstract of the report of a Committee appointed by the Council of the I.E.E. to consider the Bill introduced into Parliament by the Board of Trade to amend the Patent Laws. The Committee is to be congratulated on the striking success of its labours, in that the report was accepted almost in its entirety as embodying the views of the bulk of the scientific and engineering world, and its recommendations, communicated to the Board of Trade last month by a representative deputation, will consequently carry far greater weight with the authorities than a collection of reports submitted by individual societies, and, naturally, lacking the elements of co-ordination and cohesion. Our law-makers, unfortunately, look upon such questions from a point of view far removed from that of the industrial world, and it is exceedingly difficult to induce them to take effective action in the direction of the reforms that are so urgently needed; but we hope that, with this powerful lever, it will be possible to obtain at least a fair proportion of the amendments which were put forward by the deputation from the technical conference.

In March last we commented on the terms of the Patent Bill, which was then apparently about to come before Parliament, though subsequent events prevented its consideration; we are pleased to note that practically all the suggestions we then advanced are closely in harmony with those which are discussed, of course, at far greater length in the report. In view of the extent and variety of the changes that are called for, it was, perhaps, not wholly a matter for regret that the Bill made no further progress, and that the way is open for an entirely new and much better Bill to be drawn up. But a regrettable loss of time has been incurred, and we hope that the Board of Trade will see to it that the new Bill is introduced—and carried through—as quickly as possible, for British industry urgently needs every assistance that can be afforded to it, and the sooner the gates are opened wide for the encouragement of invention, the better will be our prospects of developing our industries of all kinds.

Amongst the leading features of the report are the demand for a prolongation of the lives of patents, equal to the dead period of the war; the recommendation that revocation on the ground of non-working shall be abolished, the provision for the granting of compulsory licences being improved; that the restrictions on patenting articles in connection with food, surgery, &c., which obviously would be a bar to progress, shall be cut out of the Bill; that the term of a patent shall be increased to 16 years, and that the periods of provisional protection and for accepting the complete specification after filing shall be extended—a very desirable reform; that the interests of the patentee shall be protected as against the Crown; that the renewal fees shall be reduced from their present excessive values by 50 per cent., to a total of £47 10s., with further reductions to follow if the revenue of the Patent Office still shows a large surplus; and that a new tribunal be set up to deal exclusively with patent cases. With all these proposals we cordially agree, though in some respects we would go further than the Committee.

One omission we note—there appears to be no reference to the desirability of instituting similar or identical rules and procedure throughout the Empire. But this is obviously not a matter that can be dealt with in a Bill. Let us first set in order our own procedure; afterwards the adoption of a homogeneous Imperial patent system may become the subject of negotiation with the Dominion authorities. That an inventor who desires to protect his inventions throughout the united British Empire should have to take out—and pay for—some 40 patents is an anomaly of which the absurdity is manifest.

Transport Facilities.

The report of the Select Committee on Transport, which has just been issued, is a document of exceptional interest, in view of the conditions which have obtained in this connection during the past four years. Under the stress of a national emergency, the whole of our internal transport facilities have been brought under State control, and have been administered by boards of experts dealing respectively with railways, canals, and roads. The result has been, says the Committee, that our railway service has been more successful than that of any other belligerent country, and has dealt efficiently with an enormous volume of traffic, while the canals have been enabled to render great assistance to the railways. We give an abstract of the report elsewhere in this issue, from which it will be seen that the keynote of its contents is *unity of control*. Whether this be exercised by the State or by a large joint-stock concern owning the railways is considered of little consequence; "the essential conditions are that there should be single ownership and single management."

Although, as the report shows, this conclusion has been put forward by various bodies which have previously inquired into the subject, it has never carried anything like the force that it does now. The experiment has been tried, public opinion has set strongly towards State intervention in this and other departments of the public service, and the time is approaching when momentous decisions will have to be formed as to future policy. We have never felt favourably disposed towards State ownership of the public services, in view of the abundant proofs of the fact that it invariably leads to loss of efficiency and economy; but we have fully recognised the advantages of unity of control, whether the subject be telegraphs, telephones, railways, electricity supply, or any other public service, and, as the Committee points out, the tendency in this direction is to be observed in all branches of industry. The question is too big to be discussed in the few lines at our disposal; but we think it desirable that the position should be clearly appreciated and considered by our readers.

A SPANISH HYDRO-ELECTRIC UNDERTAKING.

[From our Special Correspondent in Spain.]

It requires no little courage to establish hydro-electric plant in a coal-mining district, to transmit energy over 50 miles, and yet hope to compete with steam-driven plant during wartime in the north of Spain, but such audacity is now showing successful results. The company "Saltos de Agua de Somiedo" (founded with local capital) has just published an account of the installation and starting-up of its central station.

The ideal of the company is to regulate the flow of the rivers El Valle and Saliencia (province of Asturias) by means of dams, and to obtain two waterfalls of 582 and 245 metres head respectively, giving approximately 20,000 H.P., and driving six Pelton wheels of 3,300 H.P. each. The six wheels are to be placed in one power-house, three-phase energy being transmitted to Oviedo, 46 kilometres distant, and to Gijón, 71 kilometres, at a pressure of 53,000 volts. It has not been possible to install this scheme in its entirety, but two turbo-generator sets of 3,300 H.P. each have already been put in operation, and are now working successfully.

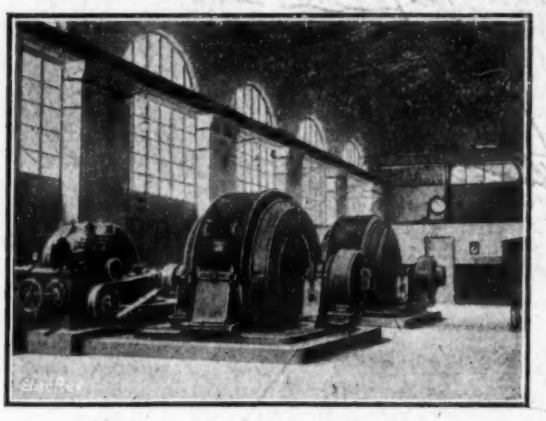


FIG. 1.—INTERIOR OF POWER HOUSE SHOWING ALTERNATORS.

FIG. 2.—EL VALLE DAM.

The Asturian mountains give rapid falls, and rains are more abundant in the province than in any other part of Spain—about 50 in. per annum. Otherwise hydro-electric energy, transmitted over long distances, could not hope to compete with thermal stations situated at the pit's mouth. The watershed covers an area of about 50,000 square kilometres, and, in addition, there is an influx of underground waters from the neighbouring province of León. The river El Valle falls 1 kilometre in 11, and the river Saliencia 1 in 14, near the site of the power house. The question of water supply has received very close attention there, there being data available and records taken since 1851, and special measurements since 1909, all of which showed greatly in favour of a hydraulic plant, as against steam power.

The first work undertaken by the company—the building of the El Valle dam (fig. 2)—took place under very severe conditions, the country being so rough and mountainous that the pioneers often worked at the risk of their lives. It was necessary to build houses for workmen in desolate and almost inaccessible places. There were no roads. These had to be made before serious work could be started, and all supplies, light and heavy, had to be transported over 60 kilometres, most of it very rough travelling. The works completed up to the date of the report are the dam and pool on the river El Valle, and various canals and pipe-lines between the river and the power house. Also, the power house building is completed.

One pipe-line of Siemens-Martin steel-plate tube is installed. This pipe has a diameter of 800 mm. where it leaves the pool, which is reduced to 650, 600, and 550 mm. respectively in the first, second, and third parts of its length. The thickness of the plate varies from 6 mm. to 21 mm.

This piping was supplied by the Mannesmann Tube Works, Düsseldorf. The contract for manufacture and erecting was signed in March, 1914. Owing to the war there were difficulties in getting the piping made and delivered, but the company persevered, and in May, 1916, the piping arrived at a Spanish port. The writers of the report naïvely say, "The receipt of the piping can be considered as a miracle, worthy of being recorded."

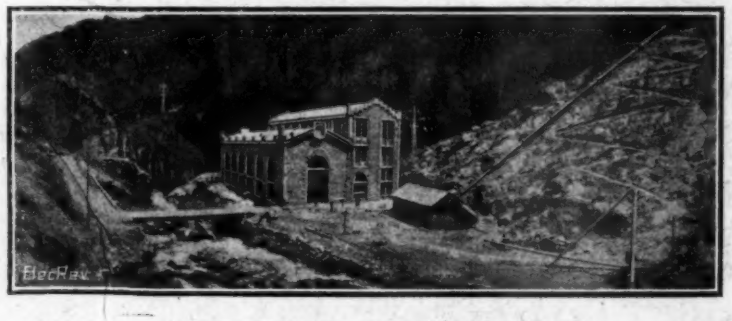


FIG. 3.—POWER HOUSE AND SURROUNDINGS.

The two water-turbines now installed (fig. 1) are of the Pelton-wheel type, and were constructed and supplied by Escher Wyss, of Zurich. Each wheel is operated by a single jet, with needle regulation and jet deflector, controlled by a "Universal" governor. The turbines are built to develop 3,228 H.P. each, with an effective head of 550 metres and a consumption of 550 litres of water per second. (A head of 550 metres is roughly equivalent to a pressure of 770 lb. per sq. in.) The manufacturers guaranteed

a minimum efficiency of 81 per cent. at full load, 82 per cent. and 78 per cent. at three-quarter and half load respectively. The contract for the supply of these two turbines was signed in February, 1914, and delivery was promised within 12 months. In spite of the war, the machinery was only a few weeks late.

All the electrical material in the central station was supplied by the Spanish branch of the Brown, Boveri Co. Its principal components are:—2 alternators and exciters, 2 step-up transformers, switchboards and accessories, and line-protective devices. The two alternators (fig. 1) are each capable of developing 2,260 KW. at a power factor of 0.7, and are rated at 3,230 K.V.A. Current is 3-phase, 50 periods, at a pressure of 5,300 volts. The exciter is mounted on an extension of the generator shaft. Bearings are automatic-oiling and water cooled. The generators are rigidly coupled to the turbine shafts. The overall efficiencies guaranteed by the makers are:—

	Full load.	Half load.
At unity power factor ...	95.5 p.c.	93 p.c.
At 0.7 power factor ...	93.0 p.c.	90 p.c.

The maximum excitation absorbs 27.5 KW. at 110 volts. The machines can sustain a momentary overspeed up to 1,080 R.P.M. (80 per cent. above normal) without danger.

The two step-up transformers, 5,300/53,000 volts, are each of 3,150 K.V.A. capacity. They are oil-immersed, and the oil is cooled by being continually pumped through a coil submerged in a small canal, through which fresh water is continually running. The transformers have also an exterior water-cooling device. The guaranteed efficiencies are:—

	Full load.	Half load.
At unity power factor ...	98.4 p.c.	98.2 p.c.
At 0.8 power factor ...	98.0 p.c.	97.8 p.c.

Copper losses amount to 30 KW., and total losses to 51 KW.

The switchboard is of the "pulpit" type, and is installed in the generator room. From this switchboard the whole central station is controlled, including the small D.C. motors which regulate the speed of the water turbines, and also those which operate the H.T. switchgear. Current for these motors is taken from the machine exciters.

The transmission lines are carried on steel lattice-work poles throughout (fig. 6). Two lines (6 wires)

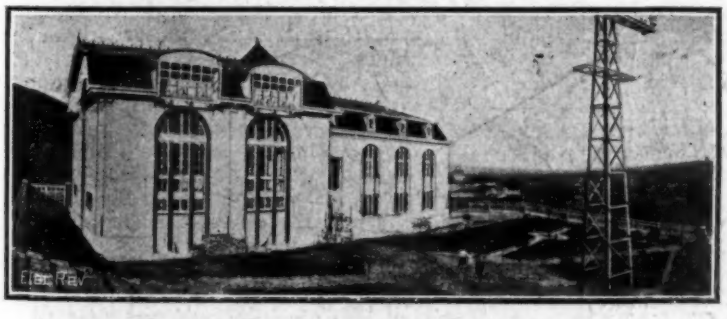


FIG 4.—SUB-STATION AT OVIEDO.

are run on each pole forming a regular hexagon of 7 ft. 2 in. between opposite sides. An earthed wire of galvanised steel is carried on a spur at the top of each pole, for protection against lightning, &c. All the wire for transmission lines was supplied by the "Sociedad Industrial Asturiana," and it is worthy of note that this company faithfully fulfilled its contract to supply some 85 tons of copper wire at 2.32 pesetas per kilogram, although the market price, by reason of the war, had reached about three times that figure before the line was installed. The insulators are all of Spanish manufacture, and were tested up to 110,000 volts before erection.

All material supplied up to the time of writing has been put to severe test, and has been working satisfactorily and without breakdown. The object of the company is solely to help in the industrial development of the district, and to make possible the existence of big industries which need power in considerable quantities and at low cost. To this

FIG. 5.—POWER HOUSE SHOWING PIPE LINE.

FIG. 6.—LATTICE-WORK POLE AT SOMIEDO.

end, it has signed agreements to supply cheap power to several subsidiary distributing companies for a period of 20 years, and has also contracted to supply 2,000 H.P. to the steel works at Gijón. With the advent of normal times the total 20,000 H.P. available will be utilised.

AUXILIARY OIL FIRING OF BOILERS.

BY A. F. BAILLIE.

THE subject of auxiliary firing of boilers had been almost entirely neglected until in the early years of this century a French engineer called attention to its possibilities. Supplementing the ordinary coal-fired burners with auxiliary oil-fuel burners was shown by him to possess many advantages, notably the facility with which a large increase in the power of boilers might be obtained at will. He further demonstrated that the combustion of the petroleum in the same furnace with the coal did not in any way prejudicially affect the combustion of the latter fuel, but, on the contrary, by the introduction of jets of petroleum into the furnace the conditions and efficiency of combustion were greatly improved, due to the more complete mixing and almost perfect combustion of all the gases present. In other words, the oil burners enable those gases produced from the burning coal to be consumed and turned into working heat, which, in the absence of such oil burners, would pass away unconsumed to the shaft or chimney stack. Subsequent work with auxiliary firing as above described has confirmed the conclusion of this pioneer, and auxiliary firing has been adopted in locomotives, naval vessels, power stations, and in other plants where a peak load is frequently encountered.

The important point is that the use of a supplementary oil burner in a coal furnace greatly improves the combustion of the latter fuel. It has been established by careful tests that when a constant rate of coal burned per square foot of grate area was maintained for many hours, the addition of 40 per cent. of oil increased the total evaporation by over 100 per cent., and at the same time increased the evaporation obtained per lb. of fuel burned by 35 per cent.

Several evaporative trials were made on the same boiler of a French warship comparing the results obtained with the coal firing and mixed or auxiliary firing. The results were as follows:—

1. *With coal only.*—18.8 lb. of coal were consumed per sq. ft. of grate area per hour, the quantity of water evaporated per lb. of coal being only 9.05 lb.

2. *Mixed Firing—45 per cent. oil.*—When 21.3 lb. of mixed fuel, consisting of 45 per cent. petroleum and 55 per cent. coal, were burned per sq. ft. of grate area per hour, the evaporation was 11.35 lb. of water, showing an evaporative increase of 25 per cent. over that of coal, as in No. 1.

3. *Mixed Firing—64 per cent. oil.*—In the third test 21.7 lb. of mixed fuel were burned per sq. ft. of grate area per hour, in the proportion of 64 per cent. of oil and 36 per cent. of coal. The result was that 14.12 lb. of water were evaporated, showing an evaporative increase of 56 per cent. over that of coal, as in No. 1.

These tests were distinctly encouraging, and should have served as a basis for further work along these lines in industrial plants, but the industrial application of the question of auxiliary firing was not commercially developed until about four years ago, when power-station engineers commenced to take a keen interest in the subject. They found that when using auxiliary firing, the poorer classes of coal could be quite satisfactorily burned which could not be used alone. This is accounted for by the fact that the inferior coal tends to cake on the links of the chain-grate stokers, thereby preventing the quantity of air necessary to complete combustion from being drawn through the bars, and resulting in a smouldering mass of fuel which travelled slowly along the bars, and was dumped into the ash-pit only partly consumed. This so-called "ash" on investigation was found to contain a very high percentage of unconsumed coal. Consequently it was found that in using inferior fuel a very much larger quantity was used per hour to maintain a given evaporation than was consumed when high-class coal was used.

As above stated, the use of fuel oil provided the way out of this difficulty, and enabled power-station engineers to use inferior coal, in conjunction with oil burners, with complete efficiency. The reason advanced for the improvement effected by the use of auxiliary oil burners in such cases is that the combustible gases rising from the coal-fuel bed were quickly ignited by the oil burners, causing the top of this mass to become much more incandescent, and thereby tending to draw through the coal sufficient air to complete its combustion.

Sufficient interest was taken in this theory for a large London power-station engineer to give his sanction for tests to be carried out under one of his coal-fired "Stirling" water-tube boilers. One burner was introduced into each side of the boiler, approximately about 25 per cent. from the back of the grate, the burners being opposite one another. The fuel oil was stored in an overhead tank, capable of holding three or four days' supply. The oil gravitated to the burners, which were of the "Kermode" steam-jet type, operating with steam as an atomising agent at a pressure of about 25 lb. per sq. in.

The first test was carried out on coal only, burning a nutty slack having a calorific value of 10,400 B.TH.U., and a boiler efficiency of 69.25 per cent. was obtained. The temperature of the combustion chamber was 2,648 deg. F., and of the uptake 660 deg. F.

The last of a series of experimental mixed-burning tests was carried out on a nutty slack having a calorific value of 10,300 B.TH.U., and Mexican fuel oil having a calorific value of 18,750 B.TH.U. A boiler efficiency of 74 per cent. was obtained, and the temperature of the combustion chamber was 2,850 deg. F., and of the uptake 628 deg. F. The ratio of coal to oil on a B.TH.U. basis was 8 per cent., and on a weight basis 4.96 per cent.

Assuming coal at 20s. 10d. per ton and oil at 50s. per ton (pre-war figures), the cost per ton of water evaporated using coal only was 2.8s., and by using the above-mentioned percentage of coal and fuel oil 2.62s., showing a monetary saving of 6 per cent.

The results, therefore, of the tests above enumerated establish the following advantages for mixed firing:—

1. A large increase in boiler output above normal rating can be quickly obtained.

2. The evaporation is much more flexible than that of coal firing.

3. A saving in cost of fuel is shown even when the cost of oil is two and a half times that of coal.

These advantages are sufficient to justify power-station engineers in considering the adoption of this method of firing in the super-power stations of the future.

INDUSTRIAL UNREST: A DIAGNOSIS AND SOME SUGGESTIONS.

By ANDREW STEWART, M.I.E.E.

A MILITARY peace has been achieved, but it would appear that industrial peace, no less desirable, cannot be reckoned upon with any degree of certainty.

The age-long battle between the "haves" and the "have nots" is entering upon another phase, and Capital and Labour, who are really co-operators in the industrial world, view each other with suspicion and distrust. Each attributes to the other vices which neither possesses, and the Socialistic Hymn of Hate is sung every Sunday by students in Socialist Sunday schools, and at adult gatherings, with a vim and enthusiasm which demands our admiration, even if it does not meet with our approval.

The workers have become suspicious, jealous of their rights, in many cases oblivious to their duties, determined to wring from their employers every advantage they can obtain, regardless of economic results. They suspect, not only their employers, but their own leaders, their organisations have become the seat of anarchy, they elect leaders and then flout them, repudiating the agreements they make with as little hesitation as a German statesman of the old style would display in breaking a treaty. They demand the control of productive industry, yet display inability to control themselves.

There are many reasons for this. Discontent of a kind is not undesirable; in so far as it is evidence of a healthy desire for progress and the improvement of the condition of the people, it is very much to be desired. The industrial unrest of to-day is not a healthy desire for prosperity by the exercise of self-control, self-denial, and education, which are the chief routes to success, but a desire to pull down the structure which supports civilisation as we know it, and substitute a new organisation, largely untried, but which, in the few cases where it has been tried, failed to achieve the results which were anticipated, and if applied on a large scale would cause the collapse of the wealth-pro-

ducing organisation of society, and labour would go with it.

The causes which have led to this discontent are various; the chief cause appears to be the discovery that high wages do not make the working man happy. He has discovered that high wages mean high cost of commodities, and he is probably no better off with high wages than with low wages. He denounces the profiteer as the cause of these high costs, oblivious of the fact that almost everybody engaged in the production and handling of the goods he requires gets about twice the pre-war wage. Moreover, the working classes have been particularly successful in this particular form of profiteering—not that they are to be blamed for taking opportunity by the hand, but they are unfair in blaming the capitalist for the result. What the working man seems to want is high wages and low costs. An object of this kind stands fairly high up in the list of things difficult to accomplish!

Another, and more serious cause, is the absence of the amenities of life. The working man is to a large extent dependent upon external things to divert him from the drab monotony of his working life. His home life does not supply it, sometimes it is more sordid than the worst workshop, and we have to thank the unimaginative utilitarians who planned the working-class districts of East London, Manchester, Leeds, Glasgow, and similar cities, for their contribution to the social unrest of the twentieth century.

After the normal necessities of life are met, a certain amount of money usually remains, and this the workman applies to the amelioration of his environment. How this is applied depends on his taste, which is largely the product of his training and education. He may in a few cases buy pictures or books and devote some of his time to self-improvement; more likely he spends his spare time following the fortunes, or misfortunes, of his favourite horse, or discussing the prospects of the local football team in the cup final. These diversions have been impossible for a long time past, and even the great international competition, now happily finished, lasted long enough, and demanded so many other sacrifices, that it no longer stirred his enthusiasm.

Under these conditions the ground is prepared to receive the seeds of political and economic discontent. Vendors of political nostrums assure the workman that he is poor because the rich man has what really belongs to the worker, and a great deal more even less accurate information is cleverly distributed. Such teaching is as great a menace to civilisation as German "Kultur," yet no effort is made to counteract it. By the worker, unused to the dialectical subtleties of the demagogue, these arguments are readily accepted at their face value. They appeal to his prejudices and class instincts, and the man whose mates would consider him as quite incapable of judging impartially on the merits of a local football team, is often accepted as an authority on the vastly more complex subjects of politics and economics. Though many of labours' demands are reasonable, and every far-seeing employer recognises that some reforms are even overdue, the difficulty is that labour's political effort is towards an unhealthy extreme. The younger men in the workshops display contempt for the advice of the older and more experienced men. These younger men are the class from whom the Bolshevist element is largely recruited. They are a minority, but active and enterprising, and may exert considerable influence on labour's policy.

Legislation influenced by this element would prove a serious menace. Bolshevism, which is the antithesis of Tsarism, is class oppression from the bottom up, just as Tsarism operated from the top down. Tyranny turned upside down is no remedy for social inequality, and labour can never undertake the direction and control of capitalistic enterprise, which is after all a highly specialised form of industry, and vital to labour. Unfortunately no effort is made to counteract these tendencies. It is everybody's business to do so, and that is probably the reason why nobody does it.

Labour, on the other hand, is vocal, its case is well put, although it represents a minority of the population, it is the best managed of all political parties, and is effective because of its homogeneity.

During the war we have seen propaganda achieve results which the sword could not accomplish; it was no less effective because it was silent. Labour realises this, but where is the Capitalistic propaganda? Who is to direct and organise the campaign for a square deal between capital and labour, or is the capitalist case to go by default?

There is a substantial substratum of working-class opinion, largely found in the engineering and allied industries, anxious for fair play. These level-headed workers know instinctively, apart from the examples they see around them, that all classes co-operate in the production of wealth, yet they get few opportunities of learning the basis on which this co-operation depends. They rely for information on sources not at all friendly to the other sections which make up civilised society, and they, too, ultimately become, if not active agents of aggressive socialism, at least lukewarm supporters. Why should this potential stabilising element in public opinion be allowed to drift into the camp of the extremists?

If the seething cauldron of civilisation boils over, it may be due more to the apathy and neglect of the classes than to the greed of the masses.

THE USE OF HIGH-PRESSURE AND HIGH-TEMPERATURE STEAM IN LARGE POWER STATIONS.

On Thursday evening last week, Mr. J. H. Shaw, A.M.I.E.E., read his paper (an abstract of which appeared in our issue of July 19th, 1918) before the Institution of Electrical Engineers.

Mr. J. S. Highfield, in opening the discussion, said that the subject chosen by the author was an important one. Many difficulties would be met with which would have to be overcome. The chief of these would be a metallurgical one; much trouble would be encountered in connection with boiler tubing and plates, and the turbine blading. There was yet much to be learned about the composition of the metal of which those plates and blades were made and their behaviour after being subjected to high temperatures. The latter question was a most difficult one, and more knowledge on the subject would be of much practical value.

Mr. Arthur H. Ellis criticised the figures for steam consumption given by the author. A figure of about 11.5 lb. was more likely to be correct, and we should have to go a long way yet before we reached the figures given in the paper. He thought that for the purposes of tests and comparisons the operating figures and data of the boiler and turbine should be given together, and not separately, as recommended by the author. The metallurgical difficulties that would be met with were many. Only that week he had seen some studs which had been subjected to high temperature steam, and they had become extremely brittle. It only needed the slightest tap with a hammer to break them. That was a very important matter, and the sooner we knew more about it the better. The author stated that "the overall efficiency of the boiler-house plant was assumed to be 77.5 per cent., which should be obtained with modern boiler control." Such a statement was very misleading; that figure was much too high, and he did not think there were many boiler-house plants which could show more than 65 per cent. efficiency. He urged that more attention should be given to boiler-house plant. If proper attention was given in that direction operating results could be greatly improved. He thought that instead of considering what radical changes could be made, such as higher pressures and temperatures, it would serve a better purpose if engineers devoted more attention to improving present conditions. If a boiler could be built which consumed a much smaller amount of fuel per lb. evaporated it would be of far greater value than the results of raising temperatures and pressures would be.

Mr. Napier Prentice said that he was not prepared to discuss the paper, but if his advice were asked for, he would say: "Don't use steam." He thought the best way out

of the difficulty would be the utilisation of a Humphrey pump and water turbine working under an artificial head. The water turbine was a much more simple machine than the steam turbine, and he thought that by some such scheme the problem would be much more satisfactorily solved:

Mr. P. V. McMahon said that whenever steam was used the old problem of throwing away large amounts of the heat of evaporation still remained. He thought that the best way out of the difficulty would be by the use of a gas engine, or some such scheme as outlined by the previous speaker. Who could compare the Diesel with the steam engine? He thought that the development of the heat engine rather than the steam engine was the proper line along which to advance.

Major A. M. Taylor congratulated the author on a very valuable paper; he thought the author had not done sufficient justice to the cause for which he pleaded. He would attempt to show, by a profit and loss account taking the author's own figures (foot of colmuns 4 and 10 of schedule I.), that financially it would not be successful unless a load factor of nearly 100 per cent. could be realised.

In the "creditor" column he would put the figure obtained by taking (50 per cent. L.F./100 per cent. L.F.) × £4,800 = £2,400 (for a 50 per cent. load factor).

In the "debtor" column he would put:—

1. Shortened life, from, say, 15 years to 10 years, and consequently increased depreciation from, say, 7½ per cent. to 10 per cent. per annum. Take the capital cost of boilers, pipework, turbines (excluding cooling towers and condensers) at, say, £5 per annum=£100,000 total cost. Thus, 2½ per cent. extra depreciation on that meant £2,500 per annum.

2. Increased radiation losses (standing). Take 10 per cent. on 6,200 tons of coal at 10s.=£310 per annum.

3. Ditto on turbo losses 10 per cent. on 15,000 tons=£750 per annum. Total "debtor" account=£3,560 per annum (2,500+310+750).

There was thus a *loss* of £1,160 per annum. With a better load factor there would be undoubtedly a saving; but on the two columns of schedule I. selected by the author one would not get a saving till nearly 100 per cent. load factor had been reached. Had he (Major Taylor) placed the extra depreciation at too high a figure? Even if only 1½ per cent. additional depreciation were taken—corresponding to a reduction in life of from, say, 15 years to 13 years—the Dr. and Cr. accounts only just balanced at 50 per cent. load factor. He was sure nobody would dare say that 1½ per cent. extra depreciation was too much to allow. He wished to ask why the author had not compared, say, column 1 with column 12 of schedule I? It seemed as though in comparing only columns (4 and 10) he had not sufficiently stated his case. If the engineering difficulties *could* be overcome up to column 10, might we not hope that they could also be overcome up to column 11, at least? It was not clear why the author had given, in fig. 1, an entropy diagram for only 100 lb. pressure and without any superheat, and then in fig. 2 a jump to 350 lb. pressure and 300 deg. superheat. The author seemed there to be overstating the case just as much as he had understated it in schedule I.

He submitted that fig. 1 should have been got out for the conditions of column 1 of schedule I., and then a visual representation would have been possible of the gain in available heat between column 1 and column 2. It was disappointing that the gain between fig. 2 and fig. 3 was so small—it did not encourage one very much to face the difficulties of the increased pressure.

Mr. G. Partridge said that in his opinion the metallurgical problems would be the most difficult ones met with; that matter should have much more attention given to it. In his own case he knew of some pipe flanges which became crystallised and so brittle that the slightest tap was sufficient to break them. The boiler feed water would also have to receive more attention; in his own case one Babcock boiler dealt with the whole of the water before it passed to the rest of the boilers, which were used simply as evaporators. He had found that such an arrangement gave very good results, and in Holland also, where it had been tried, he believed the results were satisfactory. Such an arrangement saved much trouble, time, and expense.

Mr. W. R. Cooper said that it would have been better had the author given results in thermal units instead of in lb. of coal. Results expressed in that manner were misleading at the present time when coal was of such a low grade and contained so much ash. It was common knowledge that the operating figures of the Connor Creek power station, U.S., showed such results as 20,040 thermal units per kw.-hour over the year, and that was without superheat and with a load factor of 40 or 50 per cent. The saving in coal as shown by the author was comparatively small.

Mr. E. T. Williams said he found nothing in the paper to justify the adoption of extra high pressures; he thought it would be risky to adopt high pressure and high temperature at the same time, and the problem would have to be dealt with with caution. He said that better lines along which to proceed would be the burning of gas, tar, or tar oil under the boilers. The author had not made enough of capital charges; maintenance charges also would be higher when higher pressures were used, and a matter that would have to be guarded against was the consideration of results of special tests as against actual working experiments. He thought the whole question was too large a one to be dealt with except by the country as a whole.

Mr. P. F. Allen agreed with Major Taylor's remarks on the financial side of the paper. With regard to the metallurgical problems, much more had been done during the war in that direction than was generally known, and when those results became known it would be seen that much knowledge had been gained in the last four years. At sea, working conditions of boilers were very much worse than those on land, but in spite of that, he did not know that any great difficulties had been experienced at sea as a result of the use of higher pressures and temperatures. He agreed with previous speakers that when considering efficiencies both the turbine and the boiler should be considered as one unit, and not separately, as recommended by the author. The burning of oil and gas under the boilers would give greater opportunities for improvement than would the use of coal or oil engines. The latter would mean slower speeds, which, in turn, necessitated more expensive electrical machinery and lower voltages. All those items should not be lost sight of.

The Author, replying briefly, said there appeared to be some misconception about the paper. He had not set out to justify the adoption of higher pressures and temperatures, all he had attempted to do was to draw up a fair balance sheet. There were advantages and disadvantages to be considered, and he had attempted to put the case fairly for and against. Regarding the financial questions that had been raised he maintained that in the future all units would be much larger than at present, and therefore the capital cost of plant working at 300 lb. pressure would not be greater than that of similar plant working at 200 lb. He agreed with Mr. Williams that it was questionable whether it would be advisable to adopt both high pressures and high temperatures at the same time.

NEW ELECTRICAL DEVICES, FITTINGS, AND PLANT.

Readers are invited to submit particulars of new or improved devices and apparatus, which will be published if considered of sufficient interest.

The Burleigh Totally-enclosed Motor.*

The design of totally-enclosed motors is a most interesting matter to engineers. Many devices have from time to time been proposed for increasing the output from a given size of motor frame, or, what amounts to the same thing, for lessening the material required for a given output. A device patented by Mr. J. W. Burleigh, for heat dissipating means

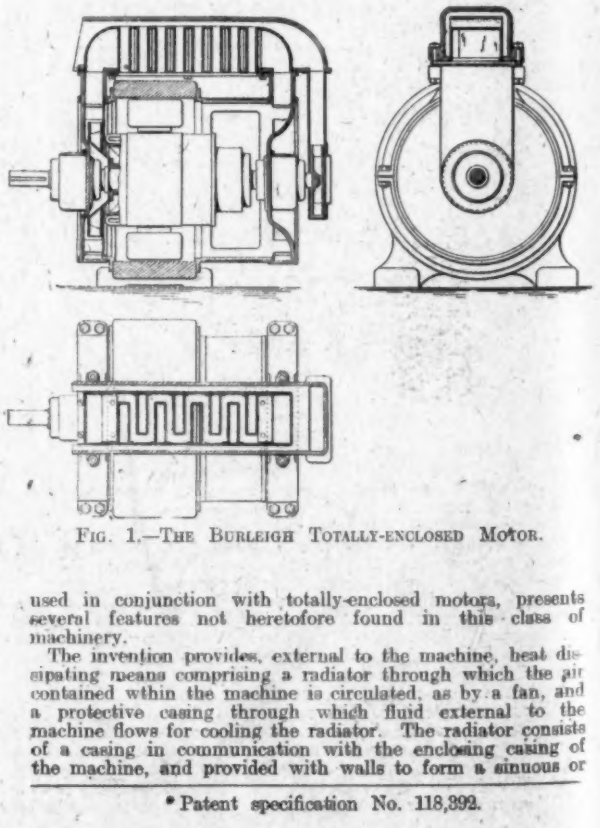


Fig. 1.—The Burleigh Totally-enclosed Motor.

used in conjunction with totally-enclosed motors, presents several features not heretofore found in this class of machinery.

The invention provides, external to the machine, heat dissipating means comprising a radiator through which the air contained wthin the machine is circulated, as by a fan, and a protective casing through which fluid external to the machine flows for cooling the radiator. The radiator consists of a casing in communication with the enclosing casing of the machine, and provided with walls to form a sinuous or

* Patent specification No. 118,392.

zig-zag path for the air to be cooled. A protective casing for the radiator provides paths along the sides and top of the latter for the flow of a cooling liquid. The walls within the radiator are hollow, and are in communication with the interior of the protective casing, and provide through the radiator a path for the cooling fluid transverse to the path of flow of the heated air therethrough. A fan is mounted on one end of the armature spindle, by means of which the heated air contained within the machine is forced through the radiator, and a pump mounted on the other end of the armature spindle pumps the cooling liquid through the protective casing. Lastly, the whole heat dissipating means are carried by a casing which is mounted on seatings on the end bearing brackets, and is adjustable thereon around the machine.

The radiator is arranged to present a very large surface to the cooling air, which is forced by the fan between its top and sides and the U-shaped cover. This system of cooling totally-enclosed motors, in many cases, it is claimed, permits of the full output, as a ventilated machine, being taken without undue rise of temperature; even with high speeds (and consequently greater iron losses) the output will be reduced by a small percentage only. Furthermore, it is stated that this heat dissipating means is so effective that its dimensions can be so reduced that the appearance of the motor with this attachment is neither bulky nor cumbersome.

By a simple arrangement the whole cooling system can be rotated around or about the motor frame for the purpose of location. This facility for allowing the portion having the greatest radial dimension to be placed in almost any position usually enables a machine of this type to occupy the same position as one of the ordinary open type.

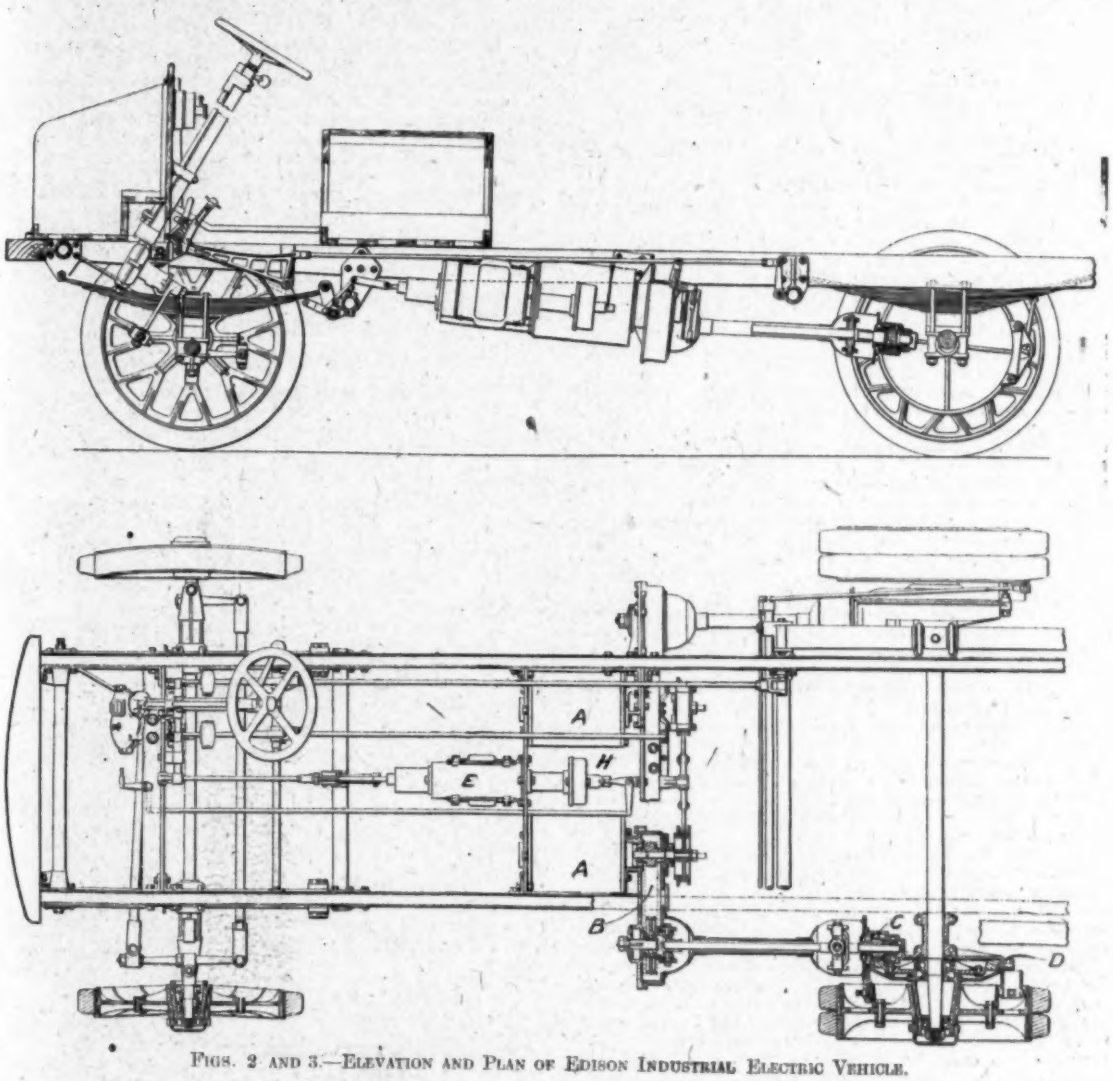
From a brief consideration of the type of motor here referred to, it will be seen that it can be adapted to an improved type of pipe-ventilated motor by attaching an inlet pipe only to the casing of the fan, and leading it to a supply of cool air. The great advantage of this arrangement is that it does not matter what impurities or moisture happen to be present in the cooling air, it does not mix with the air within the machine, hence the motor frame cannot become a dirt trap as sometimes happens in the case of ordinary pipe-ventilated motors.

It is claimed that the use of a heat dissipator, as described, will greatly reduce the constructional cost of totally-enclosed dynamo-electric machinery. The small cost of attaching this heat dissipator to standard motors will, it is believed, make its use popular with manufacturers. We understand that machines of this type will shortly be placed on the market.

Further information relating to these machines can be obtained from the patentee, Mr. J. W. Burleigh, "Homecroft," Highbridge Road, Burnham, Somerset.

A New Edison Industrial Electric Vehicle.

An interesting new design of industrial electric motor vehicle has recently been produced by Edison Accumulators, Ltd., Duke Street, St. James's, London, W. As will be seen from the accompanying illustrations, which show the



Figs. 2 and 3.—Elevation and Plan of Edison Industrial Electric Vehicle.

elevation and plan of the chassis, one of the principal features of the design is the employment of two electric motors each connected to one of the rear road wheels through a separate transmission, thus obviating the use of the usual differential gear. The two motors, A, A, are located about the middle of the chassis, one on each side of the frame, they being connected by chain gearing B to longitudinal propeller shafts—each provided with double universal joints—the final drive being by short shafts C and bevel pinions to bevel wheels D secured to the rear road wheels. The motors employed are of a fairly high-speed type, the transmission system adopted being such as to secure two speed reductions between them and the road wheels, one reduction being obtained in the chain gearing and the second through the bevel gear, the total reduction being 14 to 1. The chain gearing, the propeller shafts, and the bevel gear are entirely enclosed, and so protected from wet and dirt. The controller E is located just in front of and between the motors, it being secured to the cross-plate supporting the latter. In

this way it is claimed that the usual long wiring between the controller E—the latter is operated by a level below the steering wheel—is avoided, with a consequent reduction of internal resistance and possible leakage. To the rear of the controller is a reversing switch H, by means of which the motors can be reversed, the controller giving an equal number of forward and backward speeds to the vehicle. The controller and reversing switch are controlled mechanically. A point of interest is the location of the battery, partly in a compartment under the driver's seat and partly under the bonnet in front of the dashboard, as indicated in fig. 2, an arrangement which renders the Edison cells easily accessible for watering and cleaning and also of locating the whole weight of the battery on top of the chassis instead of being underslung. Brakes are provided on both the back road wheels and also on rearward extensions of the spindles of the motors.

REVIEWS.

Electric Motors and Control Systems. A Treatise on Electric Traction Motors and their Control. By A. T. Dover, A.M.I.E.E. Pp. xvi + 372; figs. 315. London: Sir Isaac Pitman & Sons, Ltd. Price 16s. net.

Mr. Dover has already been responsible for a book entitled "Electric Traction" which treated of the application of electric power to tramways and railways. His present book is a companion to his first one, advancing to a consideration of traction motors and the modes of controlling them. This separate method of treatment is well advised, and within the limits set by the author for the subject of the present book he has a great deal to say, every word of which makes attractive reading.

The book contains ten chapters, the first of which relates to general considerations, and the next three to a discussion of the construction and characteristics of continuous-current, single-phase, and polyphase traction motors respectively. Chapter five is devoted to the testing of traction motors, and four chapters to the control of continuous-current tramway and railway motors, and single-phase and three-phase railway motors. A further chapter treats of the calculation of the resistance sections for continuous-current motor starters.

The author's way of handling his subject is to devote the first portion of each chapter to a recital of the theory of the particular kind of machine under review, and then to examine in detail the construction of machines of the latest types which have actually been put to service in the largest electric traction schemes.

Different authors have their own methods of explaining the theory of electrical machinery, and none is more difficult of treatment than that of alternating current motors, which puts severely to the test the author's ability to bring home to minds not of the same state of advancement as his own on the subject, the salient features of the conditions underlying the operation of the plant. Out of this test Mr. Dover emerges with credit, and his explanations, while not beneath the electric traction intellect of major calibre, convey the lessons to less advanced minds with the greatest lucidity.

Perhaps the most interesting sections of the book are those dealing with polyphase traction motors and their control; and it is not too much to say that to the engineer engaged upon ordinary industrial work, the high developments of the traction motor for speed control will come as a revelation. The ordinary industrial electrical engineer, for instance, fights shy of many of the solutions of speed adjustment of the polyphase motor; but in traction work, not one but two of the permissible expedients for the achievement of this object are regularly embodied in the same motor. The combination of pole-changing and cascade control has been carried to a high pitch of development.

A feature of the book is the large number of figures illustrating the latest practice in motors and control gear. The diagrams are very clearly arranged. Perhaps no diagram can be so complicated as one of the electric train control, but no one interested can fail to be able to follow out even the most complicated diagram appearing in the book. The author has evidently been ably seconded by the various manufacturers to whom he has applied for assistance in the way of illustrations and information.

It is a great misfortune that more British material is not available on which authors of books on electric traction can draw. In pre-war days such a book would not have appeared without a very free sprinkling of illustrations of practice from what are now enemy countries; and the author has had to forgo, not quite, but almost entirely, such sources of information. But the American, Swiss, Italian, and the few British companies engaged upon electric traction have been of no small assistance to him. The illustrations of their practice, which appear in the book, will contribute largely to the education of British engineers as to what can be done in electric traction.

Particularly fortunate has the author been in his publishers. The production of half-tone blocks—a matter on which the reviewer can speak very feelingly—is highly creditable, taking into consideration the class of paper which can be used in text books, and with the few exceptions where the blocks have evidently been drawn from technical papers which employ a quality of paper permitting a higher screen of block than can be carried by the paper on which the text of the book is produced, the half-tone illustrations are beyond reproach. The printing, too, and the general arrangement are ideal.

Books of this description tend to pall upon the reader after the perusal of a few pages, but the lucidity of composition, combined with attractiveness of make-up and printing, render the book one in which the interest never flags—even of the engineer not specialising in electric traction work.

From errors, and illustrations of obsolete practice so common in books of this description, the present treatise appears to be particularly free. Perhaps, however, it may be permissible to point out, in the section relating to control of tramway motors, certain illustrations, including figs. 182 and 165, in which wooden supports for the contact fingers in a controller are employed. The illustrations presumably are of American origin. The reviewer is aware that wood enters into the construction of control gear much more in America than in this country. But with the exception of steel works service, electric traction imposes conditions more severe than any other application known to the electrical engineer, and the details of the construction of plant are therefore of very great importance. Nevertheless, with a controller for even ordinary industrial service, the reviewer would never permit a construction to be used in any plant for which he was responsible similar to that appearing in the illustrations mentioned. Micanised steel bars are British practice, and wood is prohibited; and in the details of the construction of such plant British electrical firms have no superiors. It may be, of course, that the illustrations are not quite up-to-date practice for the firms mentioned in connection with them. The point is commended to the author's consideration.—E. P. H.

CORRESPONDENCE.

Letters received by us after 5 P.M. on Tuesday cannot appear until the following week. Correspondents should forward their communications at the earliest possible moment. No letter can be published unless we have the writer's name and address in our possession.

Smooth v. Undercut Commutators.

The satisfactory working of the commutator will vary very much according to the locality and working of the machine.

I find that for machines which can be kept free from dust accumulation, and also a chemically charged atmosphere, undercut commutators work perfectly satisfactorily, provided that the undercut depth is not more than 1/16 in. or 3/32 in., then the slight accumulation of carbon dust in the interspaces can be periodically cleared.

The use of an insulating paste is by no means equivalent to the use of mica, since with overheating it has a tendency to become loose, and if it does not fall out, causes brush "jumping," and consequently sparking, and blistering of the face edge of the copper segments. Should the motor possibly become over-oiled—due to negligence or unskilled labour—the paste proves a good oil absorbent, and the adhesion of the metallic particles abstracted from the segments, or carbon from the brushes, develops short-circuits with all their concomitant evils.

For motors operating within a dusty locality, or chemically charged atmosphere, a perfectly smooth surface is preferable, since the dust particles deposited around, and the action of gases, are constant sources of commutation trouble.

Further correspondence on this subject would be most useful both to designers and users of electrical machines.

S. Hughes.

St. Georges, *November 20th*, 1918.

Motor Problems.

Several engineers have expressed their regret that your leaderettes of August 2nd and 23rd on the above subject have not met with a better response from designers or makers.

A solitary letter on the A.C. motor confirms your remark that the machine you describe is still in the future.

You deal with the rise in pressure which takes place when the field of a motor is suddenly strengthened and the armature has considerable inertia. That this will happen is clear from theoretical considerations, and is confirmed by several breakdowns traced to this cause. Additional evidence is found on page 251 of last year's Proceedings, A.I.E.E. "Trouble may also result from increasing the field strength of a motor when it is disconnected from the line. For example, a 400- to 1,600-R.P.M. motor is operating at its maximum speed. If the controller disconnects the motor armature from the line, and at the same time increases the field strength to its maximum value, the voltage across the brushes of the motor will rise to something over three times normal

voltage, unless the armature is slowed down very quickly. It can readily be seen that a 500-volt motor, having over 1,700 volts across its brushes, is apt to flash across at some part of its insulation, and ultimately be damaged. This rise of voltage has actually been observed, and care must be taken not to manipulate the shunt field so as to cause it."

I gather from the letters of your correspondents that although there may be something or other among their products that can be adapted, it is a problem which is new to them.

The Igranic Co. suggests a form of contactor gear which, although relatively cheap, would cost as much as the motor. The vibrating relay on some forms of control which I have examined does not appear to be free from faults.

May I, with due deference to the Igranic Co., suggest an alternative which can be found in their lists and in those of at least one other maker? That is, an ordinary plain type of starter or drum controller, with a separate shunt regulator having one of those simple devices which automatically short circuits the shunt resistance when the motor stops, and necessitates moving the handle to full field position before re-inserting the resistance. This device would appear to meet the editorial requirements of cheapness and simplicity. It has more than one handle, but certainly not so many as the locomotive.

There must be a number of readers interested in the subject, and this letter is written in the hope that they may be induced to give their views.

Ernest F. Butler.

London, N.W. 4, *November 18th*, 1918.

[We were very much interested to learn that the motor problem to which we drew attention had also cropped up in the United States, as long as a year or more ago; the passage quoted had escaped our notice. With regard to Mr. Butler's proposal, this, of course, does not pretend to be a solution to our problem, but we agree that it is the next best thing to a solution, and we took it into consideration when we wrote the articles referred to. Our objection to it was the use of two handles, which seemed inevitable.

We suggest that as over-voltage is the phenomenon to guard against, over-voltage should be the means by which protection is secured. A high-resistance relay, for instance, connected across the brushes, and adjusted to act when the P.D. across its terminals reaches 50 per cent. above normal, can be used to insert resistance into the field circuit; the same relay could also be adjusted to open again when the P.D. had fallen to 50 per cent. below normal, cutting out the resistance, and leaving the machine ready for restarting. —Eds. Elec. Rev.]

Hospitality to Oversea Soldiers.

At this time of rejoicing every one of us desires to express gratitude to those who have helped to protect our homes. Thousands of oversea troops will be on leave over Christmas, and unable to mingle with their own folk at home. I desire to appeal to your readers on behalf of the Rotary Club of London to open their homes to one, or preferably two, of these boys. All imaginary difficulties are surmounted. The characters of the guests are vouched for, the railway fares are paid, they will have their food ration books, and if the hostess has servant difficulties, nothing gives the guests greater pleasure than to assist, as they were accustomed to do in their own homes. We have to bear in mind that to them even a humble home is as a palace compared to the average hut or canteen.

Will those of your readers who can help, please communicate with me by return?

Trusting that this appeal to my fellow countrymen will not be in vain.

Jno. T. Mould.

147, Queen Victoria Street, E.C. 4,
November 21st, 1918.

[We have received a similar letter from Mr. Joseph Meech, of 49, Queen Victoria Street, E.C. 4.—Eds. Elec. Rev.]

Static Charge on Motor Vehicles.

I am writing to ask if any of your readers can explain a rather peculiar electrical phenomenon which I experienced a few days ago. The company I am attached to comprises Ford vanettes and a few 30-cwt. lorries. We were moving from one position to another, and our road lay across several miles of desert. The day was particularly hot (approximately 110 deg. F. in the shade) when the ignition system of several of the Ford cars failed.

Upon making a minute inspection, I found everything as it should be, but, on standing on the ground and touching any part of the chassis framework, a very perceptible spark was seen, heard, and felt between the finger and the car. The engines were stationary, and there were no batteries or accumulators fitted to any of the cars. So severe was the shock felt that the two mechanics I had with me could not be induced to go near the cars.

The only explanation I can offer is based upon the fact that a fairly strong wind was blowing at the time, which was heavily laden with dust. This dust, in my opinion, was charged with a certain amount of electricity, which caused in some mysterious manner an accumulation of static electricity to be set up in the metal chassis of the cars, which interfered with the regular ignition system. When the wind dropped the cars started almost on the first turn of the engine. The only effect the disturbance had on the lorries fitted with magnetos (Dixies) was to cause considerable misfiring.

If I remember rightly, I believe something of a similar nature occurred in America some years ago, when an electrical disturbance caused the total failure of the whole of the telephone system. I should be glad to have the opinions of some of your readers.

O. W. Bowmaker, M/S. 567,
Sergeant Electrician.

Mesopotamia E.F., *September 7th*, 1918.

[The static charge is readily explained by the dust storm, the dry rubber tires being good insulators. Why the charge should interfere with the ignition system is not easy to understand. Some years ago a somewhat similar occurrence was reported from New York.—Eds. Elec. Rev.]

A Scientific Basis for Costs.

Probably most people have felt that many of the present discussions on large *versus* small stations lose their value owing to the fact that there is no scientific basis by which to compare their costs. The existing tables, valuable as they are, do not really enable us to compare one station with another, as the conditions are so different. One station may have the same coal costs as another, and yet be using twice as much coal, the difference arising from the rate at which the coal is purchased. Then we have not sufficiently made it clear in our tables that generation costs are only part of the total costs of supply. The cost of distribution may be of far greater importance.

It is very desirable that a scientific basis should be evolved by which the real efficiencies of electricity stations could be accurately compared without reference to such accidental items as the rate of wages, the price of coal, and the rate of interest and sinking funds. Some stations pay more than twice as much into sinking funds as others, and this prejudices their results in the eyes of the inexpert public. The expert should have a means for eliminating anything of that kind when he makes comparisons. We might, for instance, take the ratio of the thermal units of the fuel to the thermal units in the electrical energy delivered by the station to the feeders. Labour might be reckoned as if paid at a standard rate. Careful consideration would evolve a scheme of comparison which would be both equitable and useful for the purposes of the present discussion, and also for many other purposes.

Having obtained a basis by which the generating costs per unit might be arrived at, we need then to arrive at the distribution costs, made up of the whole of the charges involved, such as labour, transforming losses, cable losses, and by no means least, interest and sinking fund charges. It would be found that in many cases the cost of distribution is far more important than, say, coal costs. As has been shown by Mr. Pearce and Mr. Fedden, it may pay to place a station at a situation which is not particularly favourable rather than go further away for an ideal site. This important fact, however, does not have the place in our tables of costs that it should have. If distribution costs were set out in costs tables as a separate item, just as fuel costs are, it would throw a great light on the reason why some stations do well while others do badly. It would also clear up many obscure points in the discussions relating to the super-power stations. Just whether it proved that they are desirable or whether it showed that a multitude of small stations is better, should be carefully kept out of sight until the end. What we want now is a clear and accurate statement of facts without bias to one opinion or the other.

Some years ago I proposed the term "distribution factor" for the distribution costs per unit sold. The idea did not then receive much attention, but the time now seems opportune for the revival of the idea.

C. Turnbull.

North Shields, *November 23rd*, 1918.

Close of War Matters.

Perhaps you would kindly allow me the hospitality of your columns to mention two points which I think might be of interest in connection with the close of the war, and in respect of which inquiries are being made. The first point is with regard to demobilisation. It will be of interest to electric supply companies to know that my committee has taken the matter up with the authorities, so as to ensure that the electric supply industry is placed among those "key industries" which are entitled to priority in regard to the return of their men in the Army, as we are certainly justified in claiming that among the first men to come back should be those who have left important posts in the electric supply industry.

A further point is in regard to the restrictions placed by the Ministry of Munitions on new connections for the supply of electricity. My committee has taken this matter up with the Ministry of Munitions in order to get the removal of these

restrictions directly the situation permits. It will be seen from the following letters that we have had the full sympathy of the department, and that the Director of Electric Power Supply has taken what steps he could to assist us in this matter.

[COPY.]

Ministry of Munitions of War,
8, Northumberland Avenue,
November 14th, 1918.

T. W. Cole, Esq.,
Provincial Electric Supply Committee
of the United Kingdom.

COAL ECONOMY AND NEW BUSINESS.

Sir,

I am directed to refer to your letter of the 14th inst., and to say that while we are all anxious to relax restrictions as early as possible, the Coal Controller considers it necessary to adhere strictly to the rationing scheme under the Household Fuel and Lighting Order.

I have, however, already addressed a letter to him on the question of policy, and am hopeful that before long some definite and favourable pronouncement may be possible. In the meantime the present practice should continue.

I am, Sir,
Your obedient Servant,
(Signed) ARNOLD B. GRIDLEY,
Director of Electric Power Supply.

[COPY.]

Ministry of Munitions of War,
8, Northumberland Avenue,
November 21st, 1918.

T. W. Cole, Esq.,
Provincial Electric Supply Committee
of the United Kingdom.

COAL ECONOMY AND NEW BUSINESS.

Sir,

With further reference to my letter of the 14th inst., I have to inform you that I have now had a letter from the Coal Controller, in which he states that he regrets that until the coal situation improves, it is impossible for him to agree to any relaxation of the present restrictions.

You will no doubt have observed that this has been recently announced by him in the Press.

You may, however, rest assured that as soon as circumstances admit of restrictions being modified or withdrawn, this will be done, and the electricity undertakings notified accordingly.

I am, Sir,
Your obedient Servant,
(Signed) ARNOLD B. GRIDLEY,
Director of Electric Power Supply.

T. W. Cole,
Secretary,
Prov. Elec. Supply Committee.

London, E.C. 2, *November 22nd*, 1918.

Technical Assistants.

Owing to the cessation of hostilities and the consequent demobilisation of a large number of men who have served their country in the Services and in munition factories, it is expected that large numbers of the members of this Institution will be available for the filling of vacancies in the technical and administrative departments of engineering firms.

The bringing together of suitably qualified men and appropriate vacancies is a subject which has always engaged the attention of the Institution, and for many years past has been one of the features of its activities.

In this capacity of intermediary the Institution holds a unique position in being able to draw upon all sections of the engineering profession, the membership not being restricted to any one class.

At a time like this, when the engineering activities of the country are undergoing far-reaching alterations, with the consequent changing over of a large number of technically-trained men, it will undoubtedly be of value to both employers and employés to know of this feature of the Institution's work. I shall be glad to aid any of your readers who may be in want of technically-trained assistants, and who may care to communicate on the subject with me.

Herbert G. Riddle,
Secretary,
Junior Institution of Engineers.

Westminster, *November 25th*, 1918.

The Characteristics of the Commutator Ampere-hour Meter.

In connection with Mr. G. W. Stubbings's interesting article on the mathematics of these meters, there is a point in his first paragraph which requires a little amplification.

He states that the commutator meter has not been found to be entirely suitable for accurate registration on small loads, and that for these requirements the mercury type meter still holds its own.

As the largest manufacturers of commutator meters in this country, we are able to state definitely that this is not the case. The field where the commutator meter is more than anywhere else suitable is the small load; the reason is that while it *may* be the case that on, say, 1/20th of full load a mercury meter may be more accurate than a commutator meter, this depends on what the full-load current of the meter happens to be—thus, of two meters, one of each type, each intended for a normal full-load current of 100 amps., we should be inclined to agree that at a load of 5 amps. the mercury meter would have the smaller error.

The situation, however, is reversed in the small sizes. The point of low load where the mercury meter ceases to be accurate, is set approximately at a certain figure, because the current can only pass once through the motor. In the case, however, of the commutator meter, the current passes a very large number of times through the magnetic field, as these meters are wound with a large number of turns in the armature. The armature as a whole is shunted, and by increasing the resistance of the shunt a greater proportion of the line current is caused to pass through the armature. The only limit to this process comes when the shunt resistance is infinity. This would bring the full-load current of the meter equal to the full-load armature current, which is only, of course, a fraction of an ampere, so that such a meter would read accurately down to a very small fraction of same.

It will therefore be appreciated that the commutator ampere-hour meter is the meter *par excellence* for small currents.

The Electrical Apparatus Co., Ltd.,
R. H. BARBOUR, *Director.*

London, S.W., *November 18th*, 1918.

LEGAL.

BATTERIES FOR POCKET LAMPS.—CONTRACT DISPUTE.

AN action came before Mr. Justice Sankey, in the King's Bench Division, on Thursday, November 14th, when plaintiffs, the United Kingdom Lighting Trust, Ltd., of 72, Turnmill Street, London, E.C., sued Mr. S. Davis Nicholls, trading at Bolton and London, in respect of alleged breach of contract and warranty over the sale by the defendant to the plaintiff of 12,000 batteries known as Master Batteries for pocket electric lamps, the contract price being 10s. 6d. a dozen.

The defendant denied liability and breach of warranty.

Counsel for the plaintiffs were Mr. F. A. Greer, K.C., Mr. F. T. Barrington-Ward, and Mr. Du Parc, and the defendant was represented by Mr. F. Phillips.

Mr. GREER, K.C., in opening the plaintiffs' case, explained that the goods in question were bought by the plaintiffs as Master Batteries, and were part of a large shipment from the United States. It was necessary that they should give 4 volts, and there was a guarantee to that effect, extending up to December 24th, 1917. The plaintiffs paid £525 for the goods, and their case was that they were not reasonably fit for the purpose for which they were purchased, were not of merchantable quality, and out of 12,000 delivered to them, no fewer than 11,031 did not give the proper illumination. The plaintiffs, as the defendant knew, had bought for purposes of resale in smaller quantities, and as they had sold at 13s. a dozen, the profit on the resales was 2s. 6d. a dozen. The plaintiffs claimed this loss of profit, as part of the damages, and they claimed there was a warranty that the batteries should give sufficient current for the illumination of pocket electric lamps, and that any pressure less than 4 volts was not sufficient. This order for 12,000 Master Batteries was, he believed, a very small order for the trade, and the plaintiffs' contention was that in the circumstances they were entitled to recover the price they had paid the defendant for the batteries, and damages for the defendant's failure to deliver batteries in accordance with the contract.

In support of his case Mr. GREER called a large number of witnesses.

For the defence, Mr. PHILLIPS said the batteries were sent by defendant to the plaintiffs in the original cases in which they were received, they were not touched in any way, and they had the guarantee upon them, and the defendant was perfectly willing, as his letters stated, to replace faulty batteries. When the batteries came back in the cases, the defendant reported to the people from whom he had bought them, Messrs. Farrant, and certain tests were made in December. It was then found that a very large number were over 4 volts. The guarantee in the trade was not that the money would be returned, but that good batteries would be sent instead; they were always willing to send new batteries, and several times wrote that they would do so.

Evidence was given by Mr. DARLINGTON SIMPSON, of 88, Leadenhall Street, E.C., that he had had a large experience of the battery trade. When the complaints were made, he carried out certain tests and found that 60 per cent. gave 4 volts and over. He tested about 400 out of 9,000, taking them haphazard.

After other evidence had been called, Mr. Phillips addressed the Court for the defence.

Mr. Justice Sankey, in delivering judgment, said that he was of opinion that the tests of the plaintiffs were accurate, but that those carried out for the defendant were perfunctory, and only covered a very small proportion of the goods. No notes were taken of the defendant's tests, but, on the other hand, he had full and precise information about the plaintiffs' tests. He was satisfied that the goods were not of merchantable quality, and were not reasonably fit for batteries for these pocket electric lamps. Under these circumstances, the plaintiffs were entitled to have their money back, and there must be judgment for the plaintiffs for the amount of the claim under that head, viz., £482 12s. 2d., with costs.

Pintsch Patents for Electric Lamps.

In the Patents Court, on Wednesday last week, the Cosmos Lamp Works, Ltd., applied to the Controller-General of Patents, Mr. Temple Franks, for licence to use three patents —5,026 of 1912; 16,620 of 1914, and 109,298 of 1914—for improvements in tungsten filaments for electric lamps and incidental processes of manufacture. All three patents are in the name of Julius Pintsch, Aktiengesellschaft, of Berlin, though in the case of the first there had been communication from Pintsch to the late Joseph Hubers, of Hubers & Mond.

Mr. Whitehead, appearing on behalf of the applicants, said that the Cosmos Lamp Works, Ltd., were a British company incorporated since the war, with a capital of 50,000 £1 shares, of which 49,955 were owned by the British Westinghouse Co., four were owned by British subjects, and the others by an American citizen. The applicants were the purchasers from the Public Trustee of the Brimsdown Lamp Works, the British name of the German people who owned the three patents in question. The sale to the applicants was a sale of the whole of the Brimsdown works and stock, and the well-known tungsten filament lamp of that name. The two patents, 5,026/1912 and 16,620/1914, were on the schedule of the patents comprised in the sale of the Brimsdown Co.'s stock, &c., as being patents under which they had been manufacturing. The patent No. 5,026/1912 had been worked at the Brimsdown works, and there had also been a good deal of investigation as to No. 16,620/1914. As to 109,298, nothing very substantial had been done—the patent represented merely an addition to No. 16,620/1914. No. 5,026/1912 was a patent for a process for getting ductile filaments of tungsten alloy; these filaments were prepared by squirting a compound of tungsten oxide with thorium oxide. This process had been worked commercially by the Brimsdown works and by the Cosmos Lamp Co. since they bought the business. The real problem had been to get a filament which was ductile throughout its whole length, so that one did not get "disease spots" in the material itself. The difficulty had been felt more especially in the case of filaments which were of substantial thickness. Although many experiments had been made at the Brimsdown lamp works they had never yet succeeded in getting a commercial filament substance which would work at 50 candle power so as to make it a commercial proposition. If one could get a filament which consisted of one crystal one would have accomplished the object in view, but how that was to be done so as to get a good commercial proposition was a question of very great difficulty. No. 5,026/1912 was the process actually worked by the Brimsdown Co., and No. 16,620 was an improvement particularly applicable to the filaments as made by No. 5,026. It was really a further treatment of the filament as it had been obtained by No. 5,026 or by other processes. The applicants urged that they should have an exclusive licence.

On behalf of Dr. Mond, the application for an exclusive licence was opposed, it being said that there were other people who were contemplating putting these patents into practice, and there was no case for the grant of an exclusive licence to the applicants.

Mr. Whitehead, resuming, said that it had been found possible to work No. 5,026/1912 commercially already. A great deal of labour had had to be done at the works in order to prepare the raw materials, and they had succeeded in preparing tungstic acid in a form which was particularly applicable to this process. Since the sale of this business by the Public Trustee, much labour had been expended in investigating this particular process; as a result of their past experience, they thought it would take some considerable time before there was any chance of establishing a commercial success, and they felt that unless they could get the monopoly rights, they would not be able to continue the investigations beyond a very short time.

Evidence was given by Dr. Rabinovitch, works manager of the Cosmos Lamp Works, that prior to the purchase by the company he was the chief research chemist for the Brimsdown Co., and had carried out work on the inventions as disclosed in Patent No. 5,026/1912. He described in technical detail the various experiments, and said that in order to make this a commercial proposition, a large outlay for labour and machinery would be necessary. He put considerable value on the invention if it could be worked for all sizes of filament. These processes could not at present compete with the drawn-wire process.

Mr. Terrell submitted that there was no case for the granting of the exclusive licence to the applicants.

Dr. Albert L. Mond gave evidence that he was a member of the firm of Hubers & Mond, who were agents for Pintsch and the Brimsdown Lamp Works. He helped the Pintsch people to establish their works in this country, and had reason to believe that there were other people who would possibly be desirous of manufacturing under these patents. He had read various articles that had appeared in the technical Press in Germany since 1915, and he could say that it was quite a commercial article in Germany. All the lamps manufactured at Brimsdown were manufactured under Patent No. 5,026.

Some discussion ensued on the question of royalties, and the Controller intimated that the application would be considered.

BUSINESS NOTES.

The Copper Position.—A correspondent writes to the *Financial Times*, stating that he considers that a fall in the price to £70 or under is assumed very much at random. "Surely, in an estimate of that sort the cost of production must to a large extent be considered as the determining factor, and since it is hardly likely that the cost of labour, material, and transport will sensibly decrease for a considerable time to come, the present price of copper does not appear to be liable to depreciate much—in fact, the tendency is more likely to be in the opposite direction; for it seems safe to assume that as soon as the change of the order of things from war to peace pursuits takes effect, it will be found that the demand for copper will equal, if not exceed, the one which the war furnished." To this the editor of our contemporary replies, agreeing that copper, like other base metals, will probably eventually settle down on a basis nominally higher than its pre-war average, but he repeats his opinion that "'for a time' during the possibly prolonged transition period from war to peace conditions, copper may go to an abnormally low price, due to the world's productive capacity having been stimulated since 1914 to far beyond its pre-war record, while naturally the recovery of ordinary trade demand to its old basis, let alone a higher one, must be a gradual process."

In a later issue our contemporary says:—"The cable from the Queensland directorate of the Mount Morgan Gold Mining Co. is confirmation of the fears we repeatedly expressed as to the outlook for copper during the transition from war to peace conditions in the world's markets and trade. Although the board of the company advises that work at the mine is progressing normally, the declaration of the usual quarterly dividend of 1s. per share is indefinitely postponed, 'in view of the uncertainty of disposal of copper after the end of the year.' The Mount Morgan's report recently to hand by mail, stated that the British Munitions Department had contracted to take the whole Australian output of refined copper (less local requirements) up to June 30th, 1918. The price payable for the Mount Morgan's electrolytic product was £108 per ton. It would seem, however, that the contract must have contained a clause allowing for its termination or a modification of prices on the arrival of peace. The copper outlook in general depends, of course, mainly on the United States market. There an effort is being made to maintain the current high fixed quotations until the end of this year, but it would seem that after that there must be a drastic "cut" in the interests of trades dependent on cheap copper for their activities. At the least, war insurance and any saving in ocean freights must come off current export prices."

Rathenau's Million.—The *Times* states that it is reported from Berlin that Herr Walter Rathenau, president of the Allgemeine Elektrizitäts-Gesellschaft, has placed at the disposal of the German Treasury his entire private fortune, estimated at £1,000,000. Does he intend this as a nucleus of the War Chest for the "next war," which he said must not start "a year too soon"? We look forward to a report of his next speech to the shareholders of the A.E.G. Tirpitz has shaved his beard. Has Rathenau changed his mind—or his spots?

Demobilisation of Labour.—In reply to Parliamentary questions concerning men and women who had received notice to leave their employment with munitions factories and controlled firms, it was stated that the Ministry had issued instructions that, except in extreme cases, contracts were not to be cancelled abruptly, and that full consideration was to be given to the interests of the workpeople.

The general fear of wholesale discharges from Woolwch Arsenal has led to the sinking of differences between the various Trades Unions, and a Joint Committee of Delegates of organisations representing skilled and unskilled workers of all grades has been formed with a view to inducing the Government to avoid discharges by utilising the machinery and whole war-time *personnel* of the Royal Arsenal on the manufacture of State requirements other than munitions.—*Daily Telegraph.*

The End of the War.—As the result of an amendment proposed in the Lords in the "Termination of the War" Bill, it is provided that the date of termination, which is to be fixed by Order in Council, is to be as nearly as may be the date of the exchange or deposit of the Peace ratification. This will be for the purposes of contracts, deeds, or other instruments, except where the context otherwise requires.

Agencies Wanted.—H.M. Trade Commissioner in Australia reports that an agent in Melbourne desires agencies for Victoria and Tasmania for United Kingdom manufacturers of electric motors for driving light machines and general motor accessories, British magnetos, &c. References No. 349.

The office of H.M. Trade Commissioner in New Zealand reports the receipt of the following inquiry :—An electrical engineer and electrician at Wellington desires to get into touch with United Kingdom manufacturers of electrical plant and supplies. Reference No. 354. Particulars from Department of Commercial Intelligence, 73, Basinghall Street, E.C.

Some references to Belgian and Dutch electrical agencies will be found in our "Notes" to-day.

Returning to Peace Industries.—Sir Charles Macara, in a communication to the Press, gives his views on the present situation. We make the following extracts :—

"Skilful management is quite as essential, or, indeed, even more essential, in emerging from war as in entering upon it. Given this, I believe we are on the threshold of a great future in industry. But there are problems to be solved in the industrial field and large armies to manœuvre into a safe position. We have to transfer men from their posts in the fighting Forces to their industrial posts ; and to do this, if we do not employ those who have spent their lives at the head of the great organisations of Capital and Labour controlling the staple industries of the country, we shall repeat, if not intensify, the errors that were made at the outbreak of war. In these industrial manœuvres I hope our leaders of industry will be the general officers commanding. . . . . The men who lead the organisations of Capital and Labour should closely co-operate with the demobilisation authorities. . . . . But we must help our returned Forces to realise that the delicate mechanism of the world's commerce must, under our modern system of industrialism, take some time to settle down after the violent struggle of the last four years, and what we now have to consider is how to emerge successfully from the fearful dislocation that has resulted from the war. It must be realised that all foodstuffs, raw materials in stock or in process—indeed, stock of all kinds—have been produced under abnormal conditions, and changes in the values must of necessity be gradual if we are not to be involved in serious financial disturbance. . . . I am strongly in favour of permanently raising the standard of living of the working classes, and I believe this can be done by an agreement between all the nations, and in this way alone. I always like to point to what has been done, and much has already been accomplished by international co-operation which in times past would have been considered utopian. I give it as my firm conviction, from a large experience of both national and international trade, that if the nations of the world would only fully realise their interdependence, and organised Capital and Labour were to work together in developing the undeveloped resources of the world, which, in my opinion, would give ample employment to all, the appalling waste caused by this world-wide war may be made up in a much shorter time than is generally believed."

Works War Savings.—The second annual meeting of the Faraday Works War Savings Association (Messrs. Gent & Co., Ltd.) was held on Monday, November 18th. Mr. Hardy Parsons, the managing director, presided. Reports by the officers showed that the Association had more than doubled its takings during the second 12 months of its existence, the total sum actually being £2,752. Mr. S. Ellicock, O.B.E., secretary of the Leicestershire Local Committee, congratulated the Association on its success, and urged a continuance of the war savings support.

Engineering Reconstruction : New Fields.—The Ministry of Reconstruction, in No. 5 of its series of pamphlets on "Reconstruction Problems," deals with the subject of new fields for British engineering. It gives particulars of the Committee which, under the chairmanship of the Hon. H. D. McLaren, M.P., considered the outlook, &c., for new engineering industries for making employment for available labour and machinery. The Committee set up Branch Committees to deal with the different sections of those industries, and some particulars of the work of these sections appear in the booklet. In regard to the electrical apparatus section, it is stated that this Branch Committee has so wide a field to work in that it is not yet in a position to report the full results of its investigations. "There appears to be no doubt, however, that in a very large number of trades connected with the manufacture of electrical apparatus there is room for British development. The whole question will be dealt with in a later publication by the Ministry of Reconstruction."

New British Industries.—This afternoon (Friday), at 3 o'clock, in the Conference Room of the Hotel Metropole, Mr. Kellaway, Parliamentary and Financial Secretary to the Ministry of Munitions, will address a meeting of the Industrial Reconstruction Council on "Developments in British Industry During the War."

Exhibition of Foreign-Made Goods from South America.—A large range of samples of foreign-made goods, including general hardware, tools, electrical goods, enamelled goods, &c., have recently been received from various parts of South and Central America. Arrangements have been made by the Department, with the co-operation of the Birmingham Chamber of Commerce, for them to be exhibited at 95, New Street, Birmingham, on Wednesday, Thursday, and Friday, November 27th, 28th, and 29th. The Exhibition will be open from 10 a.m. to 6 p.m. daily. Admission will be confined to manufacturers and shippers. The *Board of Trade Journal* says that invitations are being issued by the Department.

The Ministry of Supply.—As already stated here, a Ministry of Supply for the public service generally is to be developed out of the existing organisation of the Ministry of Munitions. The duty of disposing of all surplus Government property will be undertaken by the Ministry of Munitions pending the completion of the arrangements for organising the new Ministry.

Foreign Trade Representatives.—According to the *Daily Mail*, Sir A. Steel Maitland, of the Overseas Trade Department, says that one of the new commercial diplomatic officials started for Belgium, last Saturday. "We have a man temporarily in Morocco. Another is ready to start for the Balkans. Posts for Russia, South America, China, Japan, and other places have been arranged. There were only half a dozen commercial attachés connected with diplomatic work, but we are starting with about 30, and hope to increase that to 40, if Treasury sanction is obtained. Men who have seen service at the front are given a preference. There are plenty of opportunities for the best men, and some important posts will yet have to be filled. These new officers are to be embodied in the regular diplomatic service as commercial counsellors and commercial secretaries."

Engineering Hours of Labour.—According to the *Birmingham Daily Post*, the employers in the engineering and shipbuilding trades, affecting two million men, after a conference with a Joint Committee, have agreed to reduce the hours of work from 53 to 47 per week. A ballot is being taken upon the matter in the organised trades. It is estimated that the reduction of hours, which will come into operation in the first week in January, will affect about 30,000 men in Birmingham and district.

The *Leeds Mercury* says that an epoch-making ballot is commencing this week in the engineering and shipbuilding trades of Great Britain. "The employers have offered a 47-hour week without any reduction in wages, as against the present 53 hours. The men's leaders recommend its acceptance. About three million skilled workers will be affected. The end to a prolonged struggle for a shorter working week is on the eve of being realised in the engineering and shipbuilding trades of the country. The negotiations were commenced in 1913, but have been held up during the war. Last week the parties met again in London, when the Union representatives claimed a 44-hour week. The employers, in their reply, stated that the sudden cessation of hostilities called for a readjustment in the working conditions, and, as stated above, replied with the offer of 47 hours per week. The Joint Executive thereupon passed a resolution that the 47-hour week and conditions constituted a reasonable attempt to readjust the working conditions in the shipbuilding and engineering trades, and recommend their acceptance to the members of all the Unions concerned. A uniform ballot paper is being sent out for and against the acceptance of the offer. The papers must all be returned by December 16th, and in the event of a favourable reply the new scale will come into operation on January 1st, 1919."

The following well-known leaders sign the recommendation :—J. T. Brownlie, Amalgamated Society of Engineers ; J. Hill, Boilermakers ; J. Rowan, Electrical Trade Union ; R. H. Coates, United Machine Workers ; W. F. Dawtry, Steam Engine Makers ; J. Thomson, Associated Blacksmiths ; A. Gorman, A.S.E. ; J. Lawson, Amalgamated Carpenters and Joiners ; W. Paterson, Amalgamated Carpenters and Joiners ; W. Dawson, United Society of Ironfounders ; A. Wilkie, Shipwrights ; W. Thorne, General Workers ; W. Wentworth, Wood-Cutting Machinists ; F. Smith, general secretary to the Federation.

"The change will mean a reduction of six hours per week in the Manchester area and seven in the Scottish and London provinces. Under the new scheme there will be only one break for meals, and the hours suggested are 7.30 to 5 for five days and 7.30 to 12 on the Saturday, or, as an alternative, 8 to 5.30 and 8 to 12.30."

Restrictions Withdrawn.—More war-time restrictions have been withdrawn since our last issue. The Ministry of Munitions is prepared to release, without special priority permits, stocks of non-ferrous metals, so far as they are available for general industrial purposes. Application should be made to the Controller of Non-Ferrous Materials Supply, Ministry of Munitions, Hotel Victoria, W.C. 2. Permits are no longer necessary for the manufacture or sale of iron and steel wire for the home market, but applications in respect of Colonial and foreign trade must be made to the appropriate Departments. Certain prohibitions in regard to the manufacture of iron and steel and malleable iron are withdrawn.

The A.S.E. and Whitley Committees.—The *Manchester Guardian* states that the Manchester District Committee of the Amalgamated Society of Engineers has decided to instruct the local members to take no part in the formation of Workshop Committees on the lines laid down in the Whitley Report. The Committee is of the opinion that only independent organisation will be of any value.

A Crypto Canteen.—On Wednesday, November 20th, Lady Hugh Grosvenor performed the ceremony of opening a canteen which the Crypto Electrical Co., Ltd., have recently erected for the convenience and comfort of their employés. Mr. Swainson, representing the Y.M.C.A., in whose hands the catering arrangements have been placed, congratulated the company on the excellency of the appointments of the canteen, which at present does not cater for more than 300 meals at one time. The opening ceremony was followed by a concert under the chairmanship of Mr. T. E. Goodyear (chairman of the company), who expressed the hope that many other such entertainments, lectures, &c., for the benefit of all employés, would follow.

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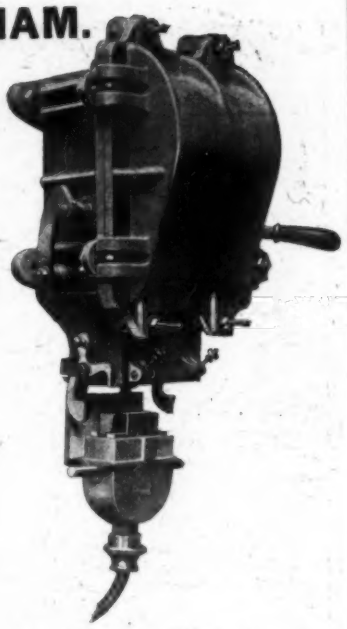

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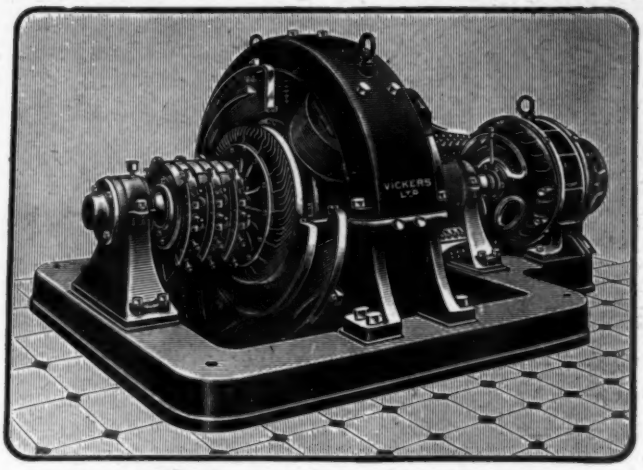

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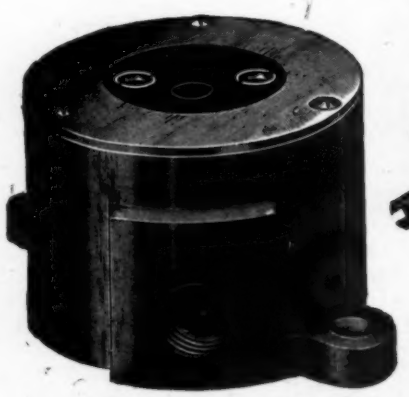

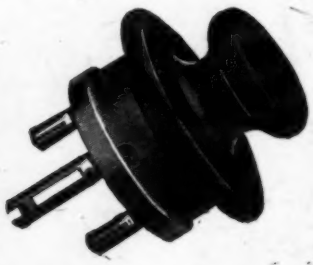

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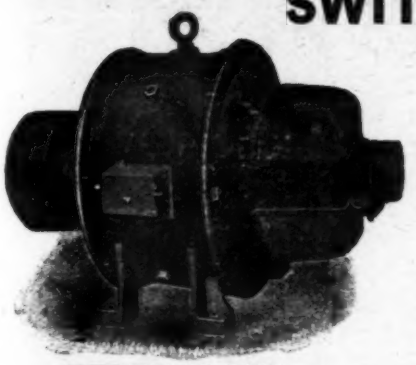

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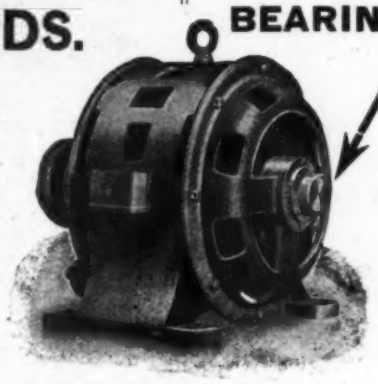

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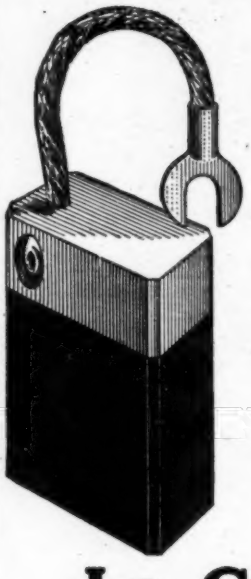

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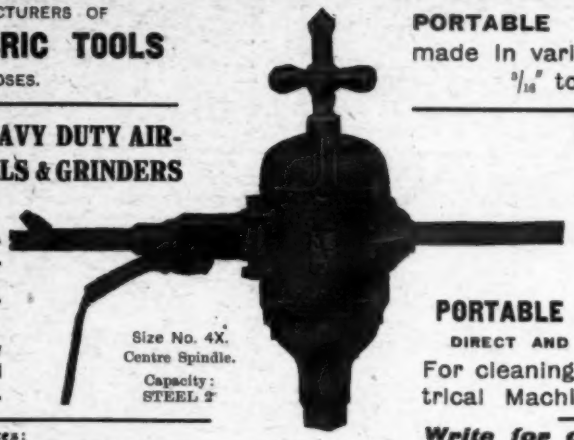

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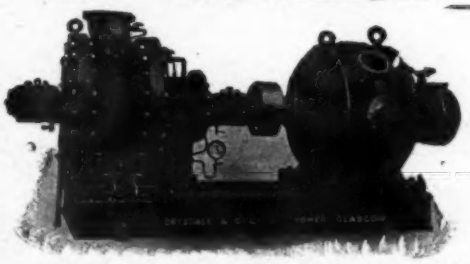

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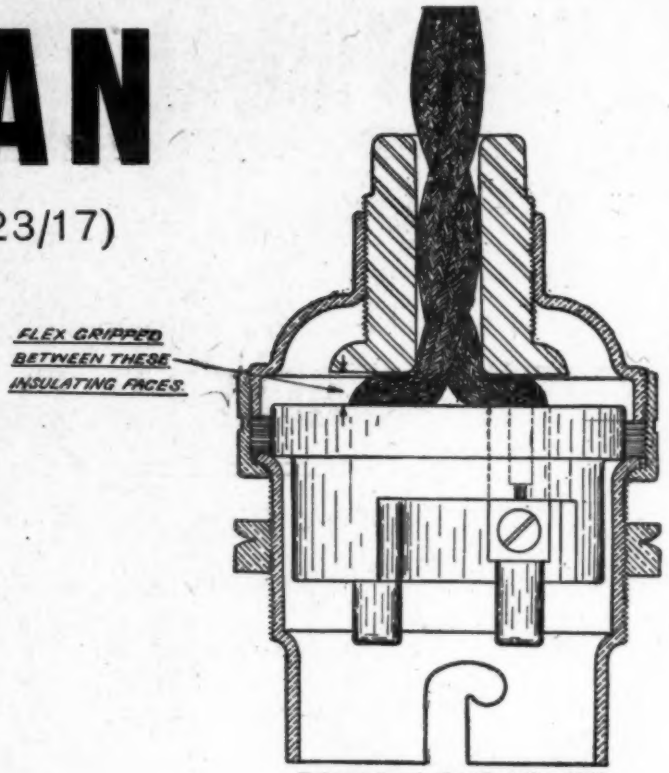
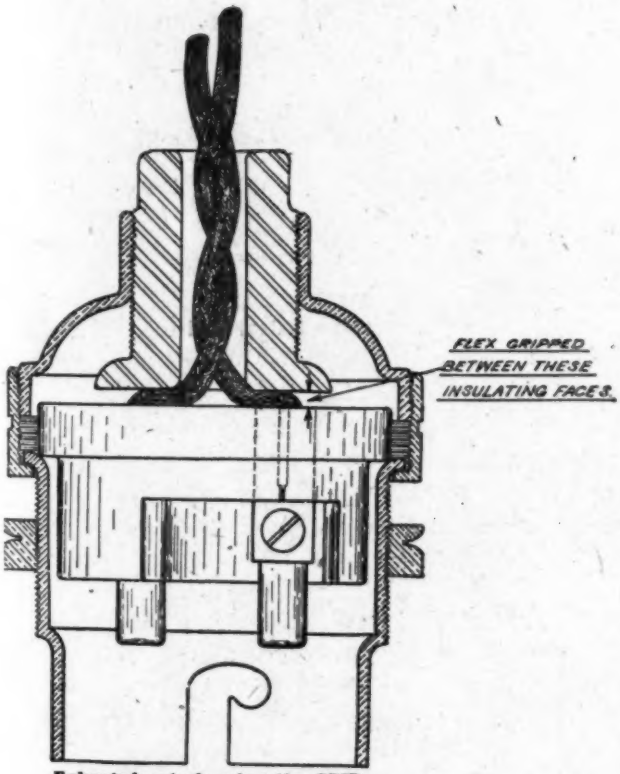


Enlarged cut showing the GRIP in use with a THICK FLEXIBLE.



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¼ „	110 „	„	1700 „
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⅓ „	220 „	„	1700 „
½ „	220 „	„	1500 „
1 „	440 „	„	2000 „
1 „	110 „	„	1500 „
1 „	220 „	„	1650 „
1½ „	110 „	„	1500 „
2 „	220 „	„	1650 „
2 „	120 „	„	1650 „
2 „	116 „	„	1700 „
2 „	110 „	„	1900 „
2 „	440 „	„	1900 „
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8 „	110 „	„	1150 „
8½ „	110 „	„	1600 „
10 „	440 „	„	1250 „
11 „	440 „	„	1200 „
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2½ „	120 „	50 „	3 „	1500 „
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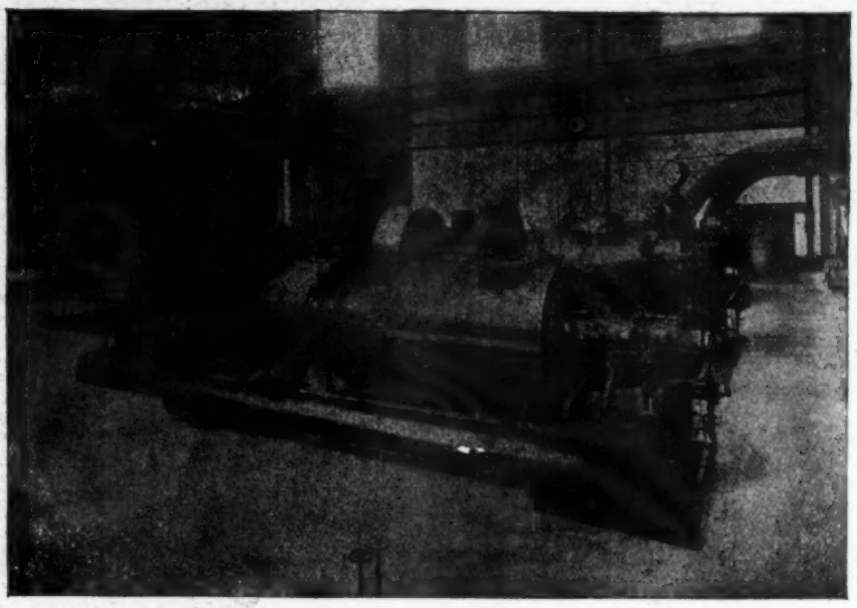

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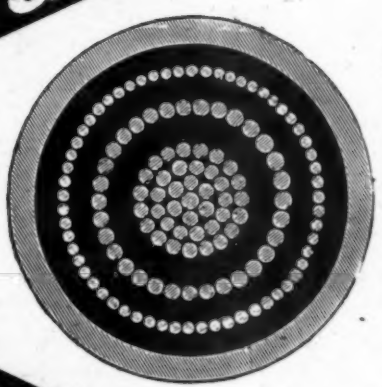

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If letters are not to be delivered to certain firms or individuals (if known), instructions to that effect should be sent to the Manager of the ELECTRICAL REVIEW, who will do his best to carry out such instructions. Letters of applicants cannot in such cases be returned to them, nor can the names of Advertisers using a number in any way be disclosed.

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WORKING ELECTRICIAN wanted to take charge (except driving) of a 125-kilowatt station with power plant driven by same and which will probably be extended soon. Trained experienced electrician and mechanic required who must have good knowledge and experience in the repair and maintenance of electric motors and must be a capable winder of dynamo and motor armatures and coils. He must also have a good practical knowledge and experience of gas engines, as he will be responsible for the upkeep of these on the station.

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WANTED, Assistant Engineer, to take charge of all Electrical Plant and equipment in Generating Station and sub-stations, and the equipment of new static sub-stations.

Must have had previous experience upon a modern E.H.T. three-phase and D.C. three-wire system.

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Apply, stating age, whether married, and giving full particulars of experience and technical training, to MR. J. TOWNLEY, Acting Borough Electrical Engineer, Barnsley.

W. P. DONALD,
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Barnsley, *Nov. 26th*, 1918. 3371

WORKS SUPERINTENDENT.

WORKS SUPERINTENDENT required for Municipal Generating Station in London District; A.C. Generation and Rotaries. Capable of carrying out all repairs and alterations, able to control men and get economical results.

State wages required, inclusive of all bonuses to date.

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FITTER.

FITTER wanted for Electricity Works in East of Scotland. Accustomed to overhaul and maintenance of turbine, Browett-Lindley engines and water-tube boilers. Permanent job to competent and steady man.

Apply, stating age, wages required and particulars of experience, to—

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OVERHEAD LINESMAN.

OVERHEAD LINESMAN required immediately, capable of taking charge of the repairs and maintenance of tramway overhead line. Permanent situation. Certified undertaking.

Apply, with references, stating experience, age and wages required, to—

F. NEWEY,
Electricity and Tramways Department,
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ASSISTANT SHIFT ENGINEER.

ASSISTANT SHIFT ENGINEER wanted. Must have had mechanical training and experience of E.H.T. power station. Wages, including bonus, 72s. 7d. per week.

Apply, giving full particulars, to S. J. WATSON, Electricity Works, Bury. 3364

SITUATIONS VACANT.—*Continued.*

TECHNICAL & PRACTICAL MANAGER REQUIRED FOR ITALY.

REQUIRED for Italy, experienced Technical and Practical Manager, one thoroughly conversant with the manufacture of Wires and Cables for electrical installations, and of vulcanised goods, including Rubber Heels. Must have good sound knowledge of the various formulas and mixings necessary to turn out reliable work.

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E. JONES & COLEGATE,
28, Fenchurch Street, London, E.C. 3. 6137

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WANTED, A FEW SUPER-DIESEL MECHANICS.

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ELECTRICAL INSTRUMENT MAKER wanted, to give Instruction to Discharged Sailors and Soldiers. Apply, stating age, qualifications, previous experience (if any), with copies of two recent Testimonials and salary required, to—

W. A. HARWOOD, *Principal*,
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CHARGE ENGINEER required for 2000-KW. Plant, Gas Engines and Producers for Public Supply. Good knowledge of gas engines with all round mechanical and electrical experience essential, must be thoroughly competent. Applications to—

J. W. NAPIER,
Corporation Electricity Department, Alloa. 3323

FITTER-DRIVER AND SWITCHBOARD ATTENDANT.

FITTER-DRIVER to take charge of Diesel Engines. Switchboard Attendant with driving experience, three-wire D.C. station with batteries.

State wages or salary, with full particulars of experience, to ELECTRICAL ENGINEER, Town Hall, Sale. 3348

SUB-STATION ATTENDANT.

SUB-STATION ATTENDANT, with experience in the running and maintenance of E.H.T. three-phase Rotary Converting Plant. Wages £2 17s., inclusive of all War bonuses to date, per normal working week of seven shifts (56 hours).—Application, with particulars and copies of Testimonials, to BOROUGH ELECTRICAL ENGINEER, Wolverhampton. 3347

PLATELAYER.

WANTED, a Platelayer, with good experience of tramway repairs and reconstruction; rate 13½d. per hour, plus 12½% on earnings; permanency to steady reliable man.

Apply, stating age and experience, to GENERAL MANAGER, Corporation Tramways, Coventry. 3213

ASSISTANT ENGINEER.

WANTED, Assistant Engineer, usual shift duties in E.H.T. 3-phase station in certified undertaking; previous 3-phase experience essential. Wages £3 1s. 6d. per week of 48 hours, usual overtime, and 12½ per cent. bonus on earnings.

Apply by letter to BOROUGH COUNCIL ELECTRICITY DEPARTMENT, 44, Powis Street, Woolwich, S.E. 18. 3372

ARC LAMP FOREMAN.

REQUIRED for London, Arc Lamp Foreman, must have had good experience in repairs and maintenance of arc lamps. Wages 10½d. plus war awards.

Apply, stating age, full particulars of experience, &c., to—

3363, ELECTRICAL REVIEW, 4, Ludgate Hill, London, E.C. 4.

(*Continued on next page.*)

SITUATIONS VACANT.—*Continued.*

FOREMAN ELECTRICIAN.

FOREMAN - ELECTRICIAN (staff appointment) wanted for works in West of Scotland, with wide experience in running and maintenance of H.T. Generators, Transformers, Motors, A.C. and D.C. and Installation of Electrical Machinery.
Apply, stating age, experience and salary required, to—
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METER TESTER.

WANTED, Meter Tester with good technical training; experience of C. & H. and Ferranti D.C. and A.C. Meters, also Mains Testing.
Apply fully, stating age, experience and wages required, to H. R. BURNETT, Corporation Electricity Works, Barrow-in-Furness. 3282

SHIFT ENGINEER.

SHIFT ENGINEER wanted for A.C. and D.C. station; must have had experience with turbines and E.H.T. 3-phase plant. Wages £3 5s., plus 12½%, per week.
Apply, giving full particulars, to the BOROUGH ELECTRICAL ENGINEER, Corporation Electricity Works, Leigh, Lancs. 3304

ELECTRICAL SUPERINTENDENT.

ELECTRICAL SUPERINTENDENT, with experience in high and low tension electrical machinery and switchgear for Scottish Municipal Electricity Undertaking.
Apply, stating age, experience and salary required, to—
3326, ELECTRICAL REVIEW, 4, Ludgate Hill London, E.C. 4.

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WIREMAN required for Lighting and Power, general repairs and meter fixing. Apply, stating age, wages required, &c., to—
3320, ELECTRICAL REVIEW, 4, Ludgate Hill, London, E.C. 4.

DRAUGHTSMAN.

DRAUGHTSMAN for Scottish Municipal Electricity Undertaking.
Apply, stating age, experience and salary required, to—
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A LARGE company of electrical and mechanical engineers require a Representative for the South Wales district. Must have a live connection among collieries. Liberal salary for first-class man.—6185, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

A LARGE firm of Telephone Engineers and Manufacturers in the provinces (Government controlled), have vacancies in their Designs and Drawing Office Sections. Applicants must have practical and technical experience. No person already on Government work will be engaged.—Apply, stating age, experience and wages required, through your nearest EMPLOYMENT EXCHANGE, quoting A6404. 3193

A NUMBER of thoroughly experienced Wiremen for country house lighting, power and telephone installations, required in Eastern Counties. Applicants must be thoroughly up in screwed tubing and casing work. Full time can be worked.—Apply MANN, EGERTON & Co., LTD., Princes Street, Ipswich. 3300

A WELL-KNOWN firm of electrical accessories and switchgear manufacturers require in their Sales Department an Assistant for the preparation of catalogues, advertisements, and similar publicity work. Should be well acquainted with lighting accessories. Please state details of experience, age, and salary required in confidence.—3303, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

A WELL-KNOWN firm of manufacturers require the services of a Superintendent for their Assembling Department. Applicants should be capable of taking charge of a department employing 150/250 hands engaged in the assembling of ironclad switches and fuses, fuseboards, lampholders, tumbler switches, wall sockets, ceiling roses, &c., and used to first-class work. They should be good organisers and disciplinarians, and capable of efficiently controlling female labour. The position is a permanent one with excellent prospects for the right man. Please give details of previous experience and salary required in confidence.—3302, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ARMATURE Winder required for Electric Railway Shop in South London district.—Apply, stating full experience and wages required, 3263, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SITUATIONS VACANT.—*Continued.*

ARMATURE Winder, with experience of traction work. Highest district wages paid.—Apply, stating experience, &c., to MANAGER, Tramway Depôt, Greenock. 3272

ARMATURE Winders, used to heavy traction motors, wanted for London railway workshop.—6214, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ARMATURE Winders, used to repair shop, D.C. work.—Apply H. D. & S., 32, Newington Causeway, S.E. 1686

ASSEMBLY Shop Foreman wanted by London electrical switchgear manufacturers.—Apply, stating age, experience and wages required, to 6050, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ASSISTANT Electrical Engineers (three), young, with drawing office, workshop and central station (steam) experience, for British East Africa. Salaries commencing at £225 to £275, according to qualifications, with free passage and living quarters.—Send full particulars to Z. M. 998, care Deacon's, Leadenhall Street, E.C. 3. 6081

ASSISTANT Estimator, young, wanted for London office of accumulator manufacturers. Permanency if suitable.—State particulars of experience and wages required, to 3229, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ASSISTANT, required for medical coils and galvanic batteries.—Apply, UNWIN & Co., 6, Lithos Road, Finchley Road, N.W. 3. 6195

ASSISTANT wanted, to take charge of Instruments, Test room, Moving Coils and Moving Iron Instruments.—State age, experience and salary required, to 3248, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

BATTERY Inspector.—A man having experience with accumulators and some electrical knowledge is required as Outdoor Inspector for vehicle batteries in the London district. A salary of £2 10s. to £3 10s. per week, according to experience, will be paid, with outdoor expenses up to 10s. per day. No person already on Government work will be engaged.—3374, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

CHIEF Designer and Draughtsmen required, capable of designing small electric motors, dynamos, and switchgear. Good salary and position to competent men.—Apply, stating age and full details of experience, 3339, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

CHARGE Engineer required. Must be accustomed to Diesel oil and gas engines.—State salary required and when able to commence duties, age and references, to MANAGER, Carmarthen Electric Supply Co. 3400

DESIGNER and Draughtsman.—Wanted, Designer used to small electrical work and experience of electric motors. Likewise a good Junior wanted. Country job, good pay, permanent position.—Apply first instance by letter to T. H. BROOKER & Co., 46, Fetter Lane, E.C. 3224

DESIGNER.—Controlled firm of motor and dynamo makers A.C. and D.C., employing about 200 hands, have vacancy for Designer. Previous experience in similar position essential, also in design of repulsion induction motors. State qualifications and salary required.—3305, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

DISTRICT Engineer required, experienced in O.H. line work, and with good knowledge of plant on consumers' premises, &c.—Apply, stating all particulars and wage required, to SCOTTISH CENTRAL ELECTRIC POWER Co., 1, Kirk Wynd, Falkirk. 2877

DRAUGHTSMAN, capable man with technical knowledge for H.T. Switchgear.—Apply, stating age, salary and experience, to 3287, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

DRAUGHTSMAN, experienced, wanted for motor starters.—State age, salary and experience, to 3286, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

DRAUGHTSMAN for electrical and scientific instruments. Electro-technical training and some experience in design advantageous.—PAUL ELECTRICAL LABORATORY, Fortis Green Road, Finchley, N. 2. 6140

DRAUGHTSMEN.—Permanent progressive positions offered to capable men with knowledge of cable accessories, junction boxes, fuseboards, street pillars, &c.; works near Liverpool.—State age, experience and salary required, 3376, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

DRAUGHTSMEN required, experienced in H.T. switchgear, in the London district.—Apply, stating full particulars of experience, age and salary required, to 3336, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

DRAUGHTSMAN required for engineer's office in Westminster. One experienced in laying out of plant and pipework preferred. State experience and salary wanted.—Write A., c/o Brown's, 39, Tothill Street, S.W. 1. 6204

(Continued on next page.)

SITUATIONS VACANT.—*Continued.*

DRAUGHTSMEN wanted for traction motors and equipments, generators and turbines for works in north-west.—Apply, stating full experience, age and salary required, to 3312, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRIC Fitters.—Several first-class men wanted at once; permanency if suitable. Full rates.—W. D. WILLSON, 85, High Street, Croydon. 'Phone 319. 6039

ELECTRIC Lamps.—Technical Assistant required to supervise orders through the factory; previous experience preferable. —Apply EDISON SWAN CO., Ponders End. 3177

ELECTRICAL Engineer, experienced in the design of electrical measuring instruments, and capable of taking charge of the engineering and designing section of a department engaged in the manufacture of such apparatus, wanted by large firm in the North. No one already on Government work will be engaged.—Apply to your nearest EMPLOYMENT EXCHANGE, mentioning No. A6374, and stating age, experience and salary required. 3274

ELECTRICAL (Scientific) Instruments. — Skilled Test-room Assistants required; preferably technically trained men with shop experience on high grade instruments.—PAUL ELECTRICAL LABORATORY, Fortis Green Road, Finchley, N. 2. 6141

ELECTRICIAN and Motor Mechanic wanted to take charge of an electric light installation which will occupy about half his time, the remainder to be devoted to any necessary repairs on Rolls-Royce, Sunbeam, and other cars. Must have good knowledge of electrical plants and be a skilled mechanic, and have had experience with Rolls-Royce cars. House, suitable for married man, provided, with light and fuel.—State wages required, and send copies (only) of references, addressed SECRETARY, Wadhurst Hall, Sussex. 3267

ELECTRICIANS wanted, permanent work at union rates to suitable men.—VERNON HILL, Broadstairs, Kent. 6190

ENGINE Driver for Suction Gas Engines, one used to vertical engines preferred; 56 hours at 1s. 2d. per hour. Two shifts. —ENGINEER, Electric Supply, Ammanford, Carmarthenshire. 3327

ENGINEER, with first-class mechanical and electrical training, wanted for estimating and contracts by large electrical and manufacturing company in Midlands. No person already on Government work will be engaged.—Apply, giving experience, salary required, and when can commence, to your nearest EMPLOYMENT EXCHANGE, quoting No. A6383. 3186

ESTIMATING Assistant required in aircraft and general engineering establishment situated in East Anglia.—Applicants to state age, experience and salary required, to 3341, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

EXPERIENCED Estimating Engineer required by leading manufacturing company.—Apply, giving experience and salary required and when at liberty, to 3343, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

EXPERIENCED Foreman or Forewoman required to take charge of flashing and mounting department, carbon filaments.—9728, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

FIRST-Class Armature Winder required, used to traction motors and manufacture of armature coils. Permanent position to suitable man. State salary required together with two references. No person already on Government work will be engaged.—Apply your nearest EMPLOYMENT EXCHANGE, mentioning No. A6412. 3228

FITTER (mechanical) wanted.—Apply with full particulars of experience, stating age, and enclosing copies of testimonials, to NORTHAMPTON ELECTRIC LIGHT & POWER CO., LTD., 25, Bridge Street, Northampton. 3214

FITTER wanted for Electricity Works in outer London district. Accustomed to overhaul and maintenance of turbine and reciprocating engines and water-tube boilers. Permanent job to competent and steady man. A.S.E. rates paid, plus awards.—Apply, stating age and particulars of experience, to 3316, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

GENERAL Sales Manager wanted for a London firm of manufacturers of accumulators, motor car dynamo lighting sets, wires and cables, primary batteries, ebonite, carbons, &c. Must have thorough knowledge of electrical and motor trade, home and export, publicity and catalogues; good organiser; excellent opportunity for first-class man. — Write, stating experience, salary required, to 3385, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

GENERAL Sales Manager wanted for a London firm of manufacturers of accumulators, motor car dynamo lighting sets, wires and cables, primary batteries, ebonite, carbons, &c. Must have thorough knowledge of electrical and motor trade, home and export, publicity and catalogues. Good organiser. Excellent opportunity for first-class man. No person resident more than 10 miles away, or already on Government work, will be engaged.—Write, stating experience, salary required, to 3361, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

JOINTER wanted, accustomed to lead-covered paper cables on 3-wire, D.C. supply. Wages 49s., plus 12½ per cent.—Apply, stating age and experience, to ACTING ELECTRICAL ENGINEER, Weymouth. 6156

SITUATIONS VACANT.—*Continued.*

JOINTER wanted, London suburban undertaking. Experienced on E.H.T. and D.C. paper cables.—Apply, stating age, experience and wages required, to 6222, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

JOINTER-Wireman wanted for high and low-tension cables; able to do own plumbing; one with experience of car wiring preferred.—Applications with experience, salary required, when at liberty, and enclosing copies of testimonials, to RHONDDA TRAMWAYS CO., LTD., Porth, Glam. 6013

LIFT Repair and Maintenance.—Wanted, immediately, capable Electrical Engineers accustomed to this work.—6143, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

LONDON Manufacturing Firm require Switchgear Draughtsmen. —Apply, stating age, experience and salary required, to 6001, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

MECHANICAL Engineer.—Required for a modern factory in West of London, a technically trained mechanical engineer, to take charge of a department employing delicate machinery.—Apply, stating age, previous experience and training, salary required, &c., to 6194, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

REQUIRED at once, first-class live man to assist General Manager in big wholesale department in executing orders, buying material and organising generally. Must have had experience of wholesale electrical supplies in the Home Counties, and also export. No applicant will be considered unless he has had at least 10 years' experience. Good wages offered. Must be disengaged to take up duties immediately.—3346, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

REQUIRED for aircraft and general engineering establishment situated in the Eastern Counties, a man accustomed to setting out operations in planning department.—Applicants to state age, experience and salary required, to 3342, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

REQUIRED, Telephone Faultsmen and Installers with intercom. experience. Good wages for good men. Permanency.—Apply between 9 and 10 any morning to I. T. C., LTD., 147/149, Great Portland Street, W., 1. 3397

SALES Manager, energetic man with knowledge of advertising, preparation of catalogues, sales and engineering experience. Good salary to man of initiative, capable of filling responsible position.—3399, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SHIFT Engineer required for power house in London area. Wages 83s. 6d. plus 12½ % per week.—3353, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SHIFT Engineer wanted at once for power station. Experience of E.H.T., A.C., also D.C. supply essential.—Apply, stating particulars of age, previous experience, salary required, with copies of recent testimonials, to RHONDDA TRAMWAYS CO., LTD., Porth, Glam. 6014

SILK Shades.—Manageress to take charge workroom. Must thoroughly understand high-class goods. Liberal salary.—Write in confidence, 6051, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SKILLED Fitters and Wiremen, for erecting electrical installations in London, Sheffield and Derby districts. Recognised rates and district allowances paid.—Write, giving particulars of experience, &c., to CONSTRUCTION DEPARTMENT, B.T.H. Co., Rugby. 3240

SWITCHBOARD Attendant wanted for low-tension, three-wire and tramways station, London district. Wages 66s., including bonuses, per week of average 53½ hours.—Apply, with references, stating age and experience, to 6188, ELECTRICAL REVIEW 4, Ludgate Hill, London.

SWITCHBOARD Attendant wanted with experience in A.C., H.T. and D.C. supply.—Reply, with copies of testimonials, stating age and wages required, also experience, to the SHEERNESS AND DISTRICT ELECTRIC POWER & TRACTION CO., LTD. 3368

SWITCHBOARD Attendants for station in Manchester district. Apply, with copies of testimonials, stating age, wage and experience, 3191, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

TEST Room Assistant wanted for general testing by switchgear manufacturers (Tyneside). No person already employed on Government work will be engaged.—Apply by letter, stating age, wages, experience, &c., to your nearest EMPLOYMENT EXCHANGE, mentioning this paper and No. 3178.

TRANSFORMER Designer required for large Manufacturing Firm in Manchester district. Must have experience in large transformers of all descriptions. Permanent position and good salary to the right man.—Address to your nearest EMPLOYMENT EXCHANGE, stating No. A6137. No one already engaged on Government work need apply. 3234

WANTED an Assistant to help in the production of high-class Electrical Insulating Materials for E.H.T. apparatus. Experience with moulded insulation an advantage. Manchester district. No one already engaged on Government work need apply.—State salary, age, &c., to your nearest EMPLOYMENT EXCHANGE, stating No. A6436. 3235

(Continued on next page.)

SITUATIONS VACANT.—*Continued.*

WANTED, an Engineer to take charge of an eight-hour watch at an electrical sub-station in London.—Apply, stating qualifications and salary expected, to 3365, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, by electrical manufacturing firm as Personal Assistant to Director, young man with electrical and mechanical training; one with several years' workshop experience preferred.—State fully, experience, age and salary expected, 6090, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, by leading insurance company, Electrical Engineers, to act as inspectors of electrical machinery. Must have experience of A.C. and D.C. machinery and workshop training. Commencing salary £150 per annum, plus £35 war bonus, with increases according to merit. State full qualifications, age and experience.—3356, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, by old-established firm of Electrical Contractors in the North of England, a thoroughly competent man for installing of private telephone and bell installations. Must have had first-rate experience, and be able to measure up and prepare quantities. A good permanent position for the right man to organise the special department.—3247, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, Electrician, to assist in the upkeep of D.C. motors and light. Armature repairing a recommendation; private installation in Midlands.—3241, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, energetic Man to look after production and shipping in a small electrical factory in the Midlands. Machine shop experience desirable, but must have commercial experience, be a capable organiser accustomed to handling men tactfully, and be able and willing to co-operate with other members of staff. Apply in own handwriting, stating age, experience and salary required.—3351, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, experienced Jig and Tool designers for large controlled electrical works in Midlands; must have good knowledge of press tools for small mechanical details, and positions are permanent for really capable men.—Apply, stating age, experience and wages required, to 3396, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, first-class Armature Winders for London repair shop. Best rates paid.—3366, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, for a South American Gold Mining Company, an experienced Mechanical Electrical Engineer, capable of rewinding motors and with a thorough knowledge of alternating-current machines. Preference given to one speaking Spanish.—Apply, PELLEW-HARVEY & Co., 62, London Wall, London, E.C. 2. 3279

WANTED for Calcutta, Engineers for power station, with some years' practical experience in the operation of high tension three-phase alternating current turbo generators, Stirling and Babcock boilers. Five years' agreement.—Apply, stating age, nationality, salary required, and enclosing copies of testimonials, to THE CALCUTTA ELECTRIC SUPPLY CORPORATION, LTD., 2, Broad Street Place, E.C. 2. 6198

WANTED for large Shipbuilding Establishment in Birkenhead district, two Armature Winders and two Electrical Instrument Makers. Good wages, plus 12½% bonus. No person already employed on Government work will be engaged.—Apply to your nearest EMPLOYMENT EXCHANGE, quoting reference No. A6397. 3183

WANTED, for London district, a number of Draughtsmen, preferably used to instrument work and small accessories.—Apply Box BE, Smith's Publicity Service, 185, Great Portland Street, London, W. 1, 6171

WANTED for London district, a number of first-class Progress men. Must be thoroughly efficient, energetic and capable of getting a maximum output; good salaries to the right men.—Apply Box BD, Smith's Publicity Service, 185, Great Portland Street, London, W. 1. 6170

WANTED, permanent Wiremen. Supply undertaking in the Midlands. Rate 1s. 3d. per hour, including all bonuses.—Reply, stating age and experience, to 3215, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, Power and Maintenance Engineer, to take control of small steam generating plant, motors, &c., heating, lighting, millwrighting, and general factory maintenance. Must have good technical experience, and be used to handling labour.—Write, stating experience, salary, &c., to 3349, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, Toolroom Foreman for small shop, magneto works. Must have had considerable experience in the design and manufacture of tools for small interchangeable apparatus, and accustomed to handling labour economically.—Write, stating salary, experience, &c., to 3350, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SITUATIONS VACANT.—*Continued.*

WIREMAN and Electrical Fitter required, fully competent all classes of work; permanency for good man; trade union rates and conditions.—Apply, ENGINEER, Electric Supply Co., Ltd., Northwich, Cheshire. 3395

WIREMAN, good man, used to factory work.—RUSSELL, Loates Lane, Watford. 6224

WIREMEN wanted for London district.—Apply F. G. EDEY AND CO., LTD., 25, Warwick Lane, Newgate Street, E.C. 4. 5993

YOUNG man wanted as Walking Foreman, with some knowledge of office routine and estimating preferred, London district.—3355, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SITUATIONS WANTED.

Cheap prepaid Advertisements are inserted under this heading at the rate of One Penny Per Word (minimum 1s.). Three Consecutive Insertions for the price of two, if ordered and prepaid with first insertion.
Box Number and ELECTRICAL REVIEW address count as seven words.

ADVERTISER desires position as Works Foreman (engineering). Held position in press and core building shops for eight years in electrical firm in Midlands. Works foreman in manufacturing and repair shop, Liverpool district, three and a-half years. Age 44. Disengaged.—6107, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ADVERTISER, 25 years' experience, been on Government work past three years, desires position of supervision or maintenance inspector.—6083, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ADVERTISER (29) desires post; late Assistant Electrical Engineer H.M. Factory; 11 years' experience power house, test room, experimental, speciality instruments and small apparatus.—6144, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ADVERTISER (35), A.M.I.E.E., desires change; chief draughtsman, development, or position of responsibility; 15 years' experience in design of switchgear, switchboards and control gear; C. and G. Hons. Certificate Electrical Engineering.—6037, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

AN Electrical Engineer desires change; 12 years' experience power and lighting installations (land and marine), E.H.T., 3-phase generation and distribution; good technical training.—6163, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

AN Engineer, young, ineligible, technical diploma, manufacturing works, power houses experience; London preferred.—6207, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ARMATURE Winder, first-class man, 15 years' experience A.C. and D.C., rewinds and repairs, good all-round repair shop knowledge, requires good situation.—6215, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ASSEMBLY or Test Shop Assistant. Officer (21), 2½ years in charge wireless station, desires post with firm manufacturing wireless apparatus or electrical instruments. First-class certificate, radiotelegraphy. I.C.S. student; energetic, ambitious, trustworthy. Released one month after appointment. In or near London preferred.—6179, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ASSISTANT Resident Engineer of Electric Power Co., desires position abroad; Public School and University.—6011, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ASSISTANT Resident Engineer, young, desires change; some D.C. experience, and 4 years' E.H.T. and L.T. transformation and distribution; South Coast or S.E. counties preferred.—6116, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

CABLE Manufactures.—Advertiser seeks re-engagement; 26 years' experience, washing, mixing, callendering, forcing, longitudinal covering, braiding, stranding, vulcanising, &c.; control of labour; home or abroad.—6128, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

CAPABLE Electrical Engineer, 14 years' practical and technical experience, seeks position where ability is appreciated.—6067, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

CHARGE Engineer, good mechanical experience, A.C. and D.C., &c., requires post.—6213, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

CLERK.—Has acted for one year as chief clerk to a small municipal electricity department. Requires situation.—6177, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

CLERK, ten years' experience Electric Supply work, accounts, wages, allocations, stores, &c., desires change.—6093, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

CHARGE Engineer, desires permanent post. 16 years' sound experience; A.C. and D.C., &c.—MR. B., c/o Baldwin, 47, Cliffe Street, Keighley, Yorkshire. 6088

(*Continued on next page.*)

SITUATIONS WANTED.—*Continued.*

CONTRACTORS' Electrical Engineer (31), desires appointment, Home or Abroad. 10 years' supervision experience in L.T. and E.H.T. cable laying and overhead transmission lines, colliery, town lighting, &c. Present, engineer manager, electric supply company.—6089, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

DIESEL Engineer and Mechanic desires change, London district preferred; 15 years' experience large gas, steam and Diesel engines, electrical machinery, &c. Good experience central station work, also mining machinery, &c.—6167, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL and Mechanical Engineer, experienced (46), seeks situation. Country charge of plant, steam, gas, oil, Diesel engines. Late of a duke's large up-to-date plant. Repairs, alterations, improvements.—6192, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL and Mechanical Engineer, fully qualified, requires post in Australia or Colonies; complete equipment and installation of works, or factory plant maintenance and management, A.C. and D.C. machinery, Diesel and turbine engines.—6044, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL and Mechanical Engineer, H.T., three-phase, D.C. and turbine experience. Held responsible position in large power house. At present engaged at munition works, will shortly be at liberty to take another post.—6212, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL and Mechanical Engineer, shortly disengaged, seeks post as Manager or Foreman; 15 years' experience shipyard, Admiralty and factory supervision; used to handling large numbers of men and all classes of electrical and mechanical plants and machinery. Thorough business training.—6005, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL Contractor's Foreman desires change; over 20 years' practical experience factory and private installations and maintenance A.C. and D.C.; good references.—6161, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL Engineer desires appointment as Manager. Experienced in layout of large power and lighting installations and maintenance. Workshop and office routine; technical; able to control staff.—6124, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL Engineer, disengaged, requires situation; 18 years' experience in all branches, technical and commercial training.—6127, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL Engineer, knowledge petrol paraffin engines, car lighting and accumulator manufacture, desires post.—6019, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL Engineer (33), ex-service, desires responsible position. 13 years' experience drawing office and central station, A.C. and D.C. generation and distribution.—6217, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL Fitter open for part-time work (union rate), first-class man.—6145, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL Mechanical Engineer (35), desires staff position College, shops, central station (mains and generation), contracting, manufacturing, and commercial experience. Sound theory, Now managing electrical department under Admiralty. Experimental work if required. Midlands preferred. £350.—6065, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICIAN, maintenance, lighting and power; used to busy machine plant; good all-round hand.—6157, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICIAN (mate or improver) requires job; 2½ years' experience lighting, bells and motor repairs.—E. WHITE, 59, Hatherly Gardens, East Ham, E. 6. 6176

ELECTRICIAN, mechanic, seeks situation; something permanent.—B., 180, Finborough Road, S.W. 10. 6211

ELECTRICIAN, well up in motors, lighting, switchboards and machinery; 10 years' experience.—6080, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICIAN-Wireman seeks situation. Construction maintenance or country house plant.—G., 17, Cloudesley Place, London, N. 6193

ENGINEER.—A gentleman with sound technical, practical and commercial training and experience, A.M.Inst.C.E., A.M.I.E.E., seeks immediate position of trust and responsibility.—6164, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ENGINEER, aged 30, desires change, supervising contract work, or Branch Managership; Midlands or North Wales; 10 years' supervisor transmission lines, cables, collieries, town lighting, conversant in handling large bodies of men, could introduce good work after war.—6018, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ENGINEER, A.M.I.E.E., age 36, practical and commercial electrical experience, desires position as Representative, speaks fairly good French, would go abroad; at present Assistant Electrical Engineer at Admiralty Dockyard.—6079, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SITUATIONS WANTED.—*Continued.*

ENGINEER, electrical and mechanical, practical and technical experience, good organiser and controller of labour, possesses initiative, tact and business ability.—35, de Crespigny Park, S.E. 5. 6172

ENGINEER, energetic, with 12 years' practical and commercial experience, desires position in Development and Publicity Department, or as Consumers' Engineer.—6022, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ENGINEER, experienced, working, 22 years' experience in charge of Large Works, doing all own erecting, own repairs, both electrical and mechanical, thoroughly reliable, excellent testimonials, disengaged.—POWELL, 70, Standen Road, Southfields, London, S.W. 6103

ENGINEER - Electrician, experienced, seeks charge of country house plant or Institution. Steam, oil or gas plant.—6033, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ENGINEER-Electrician, 16 years' experience, seeks charge of plants, steam, oil or gas; good mechanical shop experience; town or country.—JEFFERS, 5/244, Great College Street, London N.W. 1. 6210

ENGINEER-Electrician (64), married, discharged soldier, desires re-engagement on private estate; thorough knowledge of gas, oil engines, electrical plants, farm and dairy machinery.—A. REED, 40, Sherborne Road, Yeovil, Somerset. 6075

EX. R.A.F. Officer of long standing and important position Clyde district, with first-class connection amongst shipyards, iron and steel works, contractors, &c., is open early January represent good firm cable manufacturers, accessories, motors, &c.—6206, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

FOREMAN (Instrument Maker), nine years' experience as such, Age 36, active, able to get production.—6131, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

HEATING and Cooking Apparatus.—Engineer, formerly commercial manager for prominent makers, is now free to resume either commercial or productive work.—6010, ELECTRICAL REVIEW, 4, Ludgate Hill, London

MECHANICAL and Electrical Engineer, workshop and drawing office training, 16 years' experience in constructional and maintenance of modern power station, desires change, similar work.—6151, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

METER Tester and Repairer, A.C. and D.C., all types, prepayment and ordinary, Corporation, Admiralty and factory experience, also general electrical testing, references, seeks responsible post.—6180, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

OFFICER, with good pre-war experience in electrical engineering technical, workshop, drawing office, and power house construction, wishes to correspond with principals, with view to position; small progressive firms preferred.—6066, ELECTRICAL REVIEW, 4, Ludgate Hill, London,

RELIABLE Electrical Engineer (33), technical and 18 years' practical experience of oil and suction gas power plants, town supply, mains, construction, installations, freed from army, genuine engineer, open position of worth.—6165, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SOLDIER (22), good technical experience works, electrical test-bed and drawing office, desires suitable post. London district.—6182, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

TEST Assistant desires change. Accustomed to A.C. and D.C. instruments. London district preferred. Moderate salary.—6197, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

THREE Outside Erectors seek erection of plants on contract or otherwise, on gas, steam and mining; wide experience both home and abroad.—H. A., 238, Peel Green Road, Patricroft, near Manchester. 6183

WANTED, progressive responsible position, sales, buying, &c. Wide experience. Last situation 14 years. Technical and practical experience. Highest refs.—6054, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WIREMAN, used screwed tubing, repairs, testing, lighting, bells, arcs, factory work, desires permanency, London.—6008, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

PARTNERSHIPS.

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ADVERTISER (39), active, energetic and initiative, desires opening for services and capital; 12 years engineer and manager progressive and successful municipal electricity supply department, sometime four years engineer and managing director motor 'bus company operating petrol-gear, petrol-electric and battery vehicles, two years chief engineer large chemical works. Other experience covers construction and operation of electric tramways and railways and the application of electricity for driving and other purposes to a variety of manufacturing processes.—6223, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

(*Continued on next page.*)

PARTNERSHIPS.—*Continued.*

ELECTRICAL Engineer, (33), A.M.I.C.E., A.M.I.E.E., with varied experience, including instrument and research work, desires responsible post. Would invest £1000 in sound concern.—6117, ELECTRICAL REVIEW, Hill, 4, Ludgate London.

FIRM of Electrical Engineers about to extend their contracting branch, wish to negotiate with a gentleman who has an electrical business connection, on a commission or partnership basis. All office staff and expenses will be provided.—3404, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

LIFT Engineer, expert in maintenance and repairs, desires to join small business open for expansion, where active co-operation and sound progressive methods would have scope. Capital available.—6159, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

AGENCIES.

TO MANUFACTURERS OF CABLES, &c.

MANUFACTURERS of Cables, Wires, Motors, Generators, &c., desirous of being represented in

HOLLAND AND ITS COLONIES,

more particularly with a view to post-war connections, are invited to write to the

N. V. TECHNISCHE HANDEL MAATSCHAPPIJ,
Keizersgracht 418/422, Amsterdam,

a firm of repute, with extensive selling organisation, in order to make preliminary arrangements.

Particulars about the above-named firm may be had from the British Board of Trade. 6201

AGENCY FOR FRANCE WANTED.

IMPORTANT METAL HOUSE in France, established over 15 years, having large depôts and stores in a large industrial centre in the suburbs of Paris, on the banks of navigable canals, five minutes from a large passenger and goods station, with large service of transport by horse or automobile, large staff, and crane for discharging from boats, wishes to represent either wholesale or as exclusive Agents all sorts of Machines, either Industrial or Agricultural, Automobiles, Machine Tools, &c. Large English, American or other firms. Highest references and substantial guarantees.

Address: MONSIEUR POULET,
15, Rue Victor Hugo, Pantin (Seine), France. 3384

POST-WAR OVERSEAS TRADE.

COMMERCIAL Engineer (with 20 years' Indian and Colonial experience) is open to accept Agencies for enterprising firms who desire to open up, or expand, their business in India in :—(1) Wires and Cables (electric and haulage); (2) Machine Tools; (3) Motor Car Accessories; (4) General Engineer's Supplies (with a speciality).

6053, ELECTRICAL REVIEW, 4, Ludgate Hill, London, E.C. 4.

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ACABLE Agency. Insulated Wires and Cables for electrical purposes. A London house of over quarter century's standing requires sole London and adjacent Counties agency. Keen business house, having extensive connection and large storage accommodation. Negotiations with principals only.—6173, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ADVERTISER, 22 years' experience, wishes to take up Agencies for Yorkshire, Lancashire and North of England, for Accessories, wires, cables, motors, switchgear, fittings, carbons, conduits, bells, heating and cooking, miners' electric lamps, and engineering supplies.—Particulars, 6189, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

AGENTS required for all parts of the country to handle goods of a firm manufacturing Resistance Apparatus.—Apply in first case, stating terms and ground covered, to 6191, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

AUTOMATIC or other Lighting Sets.—Sole agency for Wilts and district would be considered. Good business assured.—6136, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

BRAZIL.—Wanted immediately.—To act as Engineer and Representative for British manufacturers of general electric supplies and crude oil engines by a Royal Engineer officer about to be retired. Advertiser was State engineer to Brazilian Government previous to hostilities, and has eight years valuable experience of Brazilian requirements. Selected territories where advertiser is known have been chosen, and business relations may be introduced with advantage. Contract conditions expected are two years' sole selling agency on commission with option of extending to five years. Retaining fee of £300.—For interview, please write 6178, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

AGENCIES.—*Continued.*

COMMERCIAL Engineer, with excellent connection in Lancashire and Cheshire, is prepared to consider agencies for A.C. and D.C. motors, switchgear, cables, and transformers. Works established for showing, testing, and repairing.—3200, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

CUNNINGHAM, Ltd.—Will manufacturers desiring active agents please communicate.—171, Edgware Road, London. 6205

ELECTRICAL Engineers, Liverpool district, desirous of setting up separate department for the maintenance and repair of electrically driven vehicles, wish to get into communication with manufacturers who would assist by their advice.—6154, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL Engineer, 25 years' experience, residing in Birmingham district, desires to communicate with firms interested in establishing a Birmingham Agency for post-war activities.—6121, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL Firm, with extensive showrooms in West End of London are open for Agencies. Motors, Dynamos and Tools.—Apply WALLACE & Co., 53, 56 and 58, High Street, W.C. 6074

ELECTRICAL Goods (Export).—Electrical Engineer (French), 10 years with important company in Paris, wishes to represent first-class English house desirous of extending in France.—L. LODI, 17, Rue Peligot, Enghien, near Paris. 6203

ELECTRICAL Supplies for ships and factories. Electrical firm with offices and stores in City, is desirous of representing manufacturers for Liverpool and district.—6004, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ENGINEER'S Agent, good connection with shipyards, &c., is open to represent in Belfast, or for all Ireland, first-class motor and dynamo manufacturers, a C.M.A. firm, and an accessories manufacturing house.—6152, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

FIRM of merchants and agents in Glasgow, with valuable connection throughout Scotland, are open to consider agencies for high grade electrical material.—6132, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

FRANCE.—Agent, in touch wholesale buyers, wishes exclusive Agency for (1) France, or (2) S.E. France. All classes electrical goods; highest references.—6068, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

GLASGOW Electrical Firm is desirous of representing manufacturers of Electrical Specialities, Labour-saving Tools, &c. Excellent showroom, storage accommodation and connection.—6200, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

MACDONALD, Syer & Co., Ltd., 295, Gray's Inn Road, London, are open to represent manufacturers of Motors, Switchgear and Electrical Fittings generally. 3367

OLD-established electrical firm, with offices and stores in London, are open for agencies. Good connection among engineers, architects, builders and householders.—6142, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SOLE Agents required in large towns for patent apparatus converting any make of hand lift or crane to power by utilising existing gearing without alteration. Many already in use. Firms applying must be able to supply and fix the necessary electrical equipment and erect the patent Deplaro, which will be supplied on satisfactory terms.—PICKERING HOIST Co., Parliament Mansions, Victoria Street, London, S.W. 1. 3405

SOUTH America.—First-class firm with branches all over the Argentine, Brazil, and Chile requires agencies for all kinds of general, electrical, and engineering supplies. Fully qualified technical staffs. Good references.—3338, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

TO Electrical Manufacturers.—Representative (Electrical Engineer), good connection in Lancashire and Yorkshire, requires speciality lines or agencies, lamps, flash lamps, A.C. or D.C. equipment, accessories. New ground worked. Expenses and commission.—6162, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WELL-known electrical firm is open to consider an agency for high-class electrical plant for Lancashire district.—3201, ELECTRICAL REVIEW, 4, Ludgate Hill, London

WELL-Known London Electrical Engineers require Agency.—6069, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

FOR SALE.

NEW MOTORS AND GEAR.

1, 2, 5, 8, 10, 15, 20, 25, 30 H.P., A.C., 2 and 3-phase; also D.C., 220 v., and 440 v., complete with Starting and Switch Gear. Lighting and Power Home Office Distribution Fuse Boards. Cable 1/18 to 37/16 C.M.A. and non-Association, 600 megh. Immediate delivery. Guaranteed 18 months.

"ROBUST MACHINERY," 62, Bradford Street, Walsall. 3314

(Continued on next page.)

FOR SALE.—*Continued.*

MACHINERY FOR SALE.

PORTABLE Screw-driven Column Type Slotting Machine, with circular motion, to column about 4′ 6″ stroke.

Motor-driven Face-Milling Machine (by Hetherington and Co.), with facing head, 18″ diameter.

Geared-driven Duplex Screwing Machine (by Dron and Lawson), with dies up to 2½″ diameter, Whitworth thread.

Portable Electric Radial-Arm Drilling Machine (by Kendal and Gent), 6′ arm, 2½″ spindle.

No. 2 size powerful Motor-driven Portable Facing Machine for roller paths of large gun turrets, swing bridges, &c.

10′ Faceplate Triple-geared Boring and Facing Lathe (by H. Broadbent), with self-acting swivel slide rests.

6′-swing Triple-Geared Boring and Facing Lathe (by H. Broadbent), with internally-geared faceplate, 4′ 6″ diameter.

Automatic Horizontal Drop-Valve Engine (by Robey and Co.), with cyl. 20″ diameter, 2′ 6″ stroke.

Horizontal Corliss Engine (by Hick, Hargreaves), with cyl. 18″ diameter, by 36″ stroke.

Duplex Horizontal Boring Machine (by Butler), two upright standards, 7′ high, carrying boring saddle with 3½″ spindles.

CATALOGUE of Stock MACHINERY. 2-3000 LOTS. Free on Application. Inspection invited.

THOS. W. WARD, LTD., ALBION WORKS,
Tel.: "Forward, Sheffield." SHEFFIELD.

R. H. LONGBOTHAM & CO., LTD., WAKEFIELD,
and at Milburn House, Newcastle-on-Tyne.

Tel.: { 44 Wakefield. / 867 Newcastle. } Telegrams: "Engineer, Wakefield."

FOR SALE.

ONE Parsons Steam Turbo, 1500 KW., 2-phase, 2000 volts, 50 periods. Complete with condensing plant.

One Willans-Parsons Steam Turbo Set, 1200 KW., with Alternator, 1200 R.P.M., 200 lbs. to sq. in., 11,000 volts, three-phase, complete with exciter, also condensing plant, air, and circulating water pumps, &c.

One 500-KW. triple-expansion Set, engine by Browett and Lindley, H.P. cyl. 17½″, I.P. 25″, L.P. 35″ × 14″ stroke. Single-phase Alternator, by British Westinghouse Co., 2100 volts, complete with exciter, &c.

One 225-KW. Generating Set, engine tandem comp. type, 300 H.P., with Corliss Valve Gear, &c., B.T.H. Generator, 500 volts, compound wound.

One Surface Condenser, by J. & H. McLaren, capacity 3000 cls. per hour, with circulating pump.

Two Exciters, 180 volts, 80/100 amps., 200 R.P.M. 5277

FOR SALE.

12-VOLT DYNAMO, 750 amps., two Commutators, 1150 revs. Almost new. Makers: Canning & Co.

140-volt Dynamo, 50 amps., 1030 revs. Makers: Greenwood & Batley.

Transformer, 3-phase, 500 to 220 volts, 50 periods; output, 15 K.V.A. continuously. Secondary pressure can be changed easily to 110 volts. Makers: Ferranti.

Alternating Motor Starter, large size. Makers: Erskine, Heap & Co.

55 yards double-wire armoured, 19/16 three-core Cable, Association; 2500 megohm grade.

Particulars from—

JAMES NEILL, LTD.,
1, College Place North,
Belfast.
5811

ELECTRICAL PLANT FOR SALE.

ONE 300-KW., 220/250-volt Generating Set, comprising "Howden" enclosed compound engine, coupled to compound interpole Generator.

One 500-KW., 220/250-volt Generating Set, comprising "Bellis" enclosed compound engine coupled to compound-wound Generator, and complete with condensing plant.

One 450-KW., 500-volt Set, as above, with or without condensing plant.

THE PHŒNIX ELECTRICAL CO.,
32—36, Broomielaw,
Glasgow. 2429

FOR SALE.—*Continued.*

MACHINERY FOR SALE.

D.C. MOTORS.

H.P.	Volts.	R.P.M.	Windings.	Makers.	Type.
30	400/440	850	Shunt intple.	Royce Bros.	Encl's'd, v'ntilat'd.
27	460/480	950	" "	Brush Elec.	" "
20	440/460	750	" "	Bruce Peebles	" "
20	440/460	1250	" "	E.C.C.	Tot. en., pipe vent.
15	230	800	" "	Royce Bros.	Encl's'd, v'ntilat'd.
13	400/420	1000	Shunt wo'nd.	Mather & Platt.	Totally enclosed.
12	200/220	950	" "	Cutting Bros.	Encl's'd, v'ntilat'd.
10	420	1000	" "	Electromotors.	" "
10	400/440	750	Shunt intple.	"	Totally enclosed.
9½	400/460	750	" "	E.C.C.	" "
8	230	480	" "	Royce Bros.	Encl's'd, v'ntilat'd.
8	440	950	Shunt wo'nd.	Gen. Elec. Co.	Tot. en., reversing.
7½	440	880	" "	Siemens Bros.	Encl's'd, v'ntilat'd.
7½	230	880	" "	" "	Totally enclosed.
5	230	880	" "	" "	Encl's'd, v'ntilat'd.
5	440/460	1200	" "	Cutting Bros.	" "
4	400	1150/1835 variable.	" "	Gen. Elec. Co.	" "

A.C. MOTORS.

H.P.	Volts.	R.P.M.	Periods.	Phase.	Makers.	Type.
30	400	750	50	Three.	Clayton Motors.	Encl's'd v'ntilat'd.
12	420	960	50	"	Gen. Elec. Co.	" "
10	440	950	50	"	Brook & Co.	Tot. en., pipe vent.
5	420	1450	50	"	Wright & Wood.	Encl's'd v'ntilat'd.
3	420	1450	50	"	" "	" "

GENERATORS.

17 KW., 230 volts, 1200 R.P.M., shunt wound, Holmes & Co., makers, enclosed, ventilated type.
300 watt, 160 volts, 1250 R.P.M., shunt wound.

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Electricity Department.

ENGINES, ALTERNATORS and CONDENSING PLANT
For Sale by Private Treaty.

OFFERS are invited for the following plant, discarded to make room for larger sets:—

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Two sets horizontal surface Condensing Plant, by Mirrlees Watson, each having a cooling surface of 3400 sq. ft., one set being equipped with Air Pumping Engine and Circulating Engine, and the other set with Air Pumping and Circulating Motors.

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The plant is in good working order and can be inspected by appointment.

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C. NELSON HEFFORD,
Manager.

1, Whitehall Road, Leeds.
November 23rd, 1918. 3328

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Three 105-KW. Hindley 5-cylinder vertical Gas Engines, direct coupled to 500-volt D.C. Generator. Available now.

Two 180-KW. do. do., in process of manufacture.

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One compound-wound Generator, 310 amps., 240 volts, 540 R.P.M.

One compound-wound Generator, 128 amps., 250 volts, 900 R.P.M.

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(Continued on next page.)

FOR SALE.—*Continued.*

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General Post Office.
November, 1918. 3337

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Two	2	220	40	800	14
Two	2	200	50	1000	10
Two	2	220	40	800	20
Three	2	200	50	1000	17
One	2	220	40	800	25

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MAGNIFICENT 500-H.P. Horizontal Tandem Gas Engine, together with 350-KW. Alternator, by G.E.C., 230 volts, three-phase. Price £2,500. Set will be sold separately if desired.

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FOR SALE.—*Continued.*

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225-KW. Willans-Siemens Set, 410 v., D.C.
75-KW. E.C.C. Machine, 110 v., D.C.
Electric Sinking Pump, 20 H.P., 220 v., D.C.
30-H.P. Laurence-Scott Motor, series wound, 460 v., D.C.
20-KW. Machine, 205 v., D.C.
Motor-Generator Set, 230 v., 30 amps., to 55/80 v., D.C.
31-H.P. Siemens S.C. Motor, 500 v., 3-phase, 50 cycles, 1,450 R.P.M.
600-H.P. E.C.C. Motor, 2,000 v., 2-phase, 50-period, 730 revs.
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Ammeters, Cable.

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(*Continued on next page.*)

FOR SALE.—*Continued.*

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(*Continued on next page.*)

FOR SALE.—*Continued.*

FOR Sale, vertical, high-pressure, three-throw Pump; plungers 7½" × 9" stroke; driven by steam engine. Prompt delivery.—WILLIAMS & SONS, 37, Queen Victoria Street, London. 3294

FOR Sale, 8, 18, 45 and 90-H.P., 220-volt, D.C. Motors.—THE PHŒNIX ELECTRICAL CO., 32/36, Broomielaw, Glasgow. 3208

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OLD Incandescent Lamp Tops.—6155, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ONE Fellows Gear Shaper, preferably the No. 6 machine. Must be in first-class condition.—3392, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

(*Continued on next page.*)

ARTICLES WANTED.—*Continued.*

ONE 200-v., 1-phase, 60 cycles, 5-H.P. Motor.—Particulars to S. E. HUNT, Electrician, 6, The Exchange, Brighton Road, Croydon. 'Phone: 370 Croydon. 6219

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SMALL Motor-Generator Cinema Set, 200-v., 60 cycles, 1-phase, to 50-v., 20 amps., or nearest.—6218, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, a few 400-volt, 50-cycle, 3-phase Motors, preferably slip-ring type, 5 to 35 H.P.—8133, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, burnt-out A.C. Motors, over 1 H.P.—MILLARD, Gilbert Road, Belvedere. 6097

WANTED, direct-coupled Set, about 50/75 KW., 220 or 440 volts, D.C., preferably the latter. Full details and price must accompany offer.—2828, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

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WANTED, Lister-Bruston Auto Plant, second-hand, about 20 lights.—Full particulars to PARSONS, King Edward Street, Hull. 3219

WANTED, One cwt. 40 S.W.G. Enamelled Copper Wire.—MAGNETOS, LTD., 45, Broad Street, Bloomsbury, W.C. 2. 3373

WANTED, one or two large Motors, from 100 to 200 H.P., 440 volt, D.C.—State particulars to 3340, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, Second-hand Motor, 35 to 40 H.P., 460 volts, D.C., moderate speed.—6221, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, several "Reason" Maximum Demand Indicators of various sizes, for 230 v. and 460 v., must be in good condition.—Full particulars and price to 3398, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

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WANTED, 100/150-volt Dynamo, 20 amperes.—T. P. POLLITT, AND Co., LTD., 9, Wellington Street, Hull. 3357

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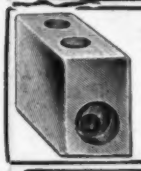

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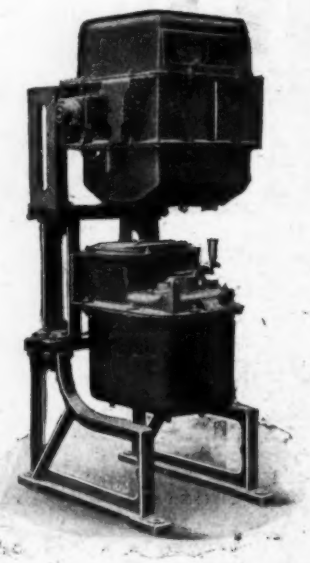

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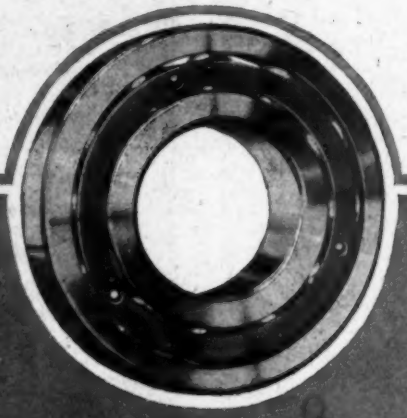

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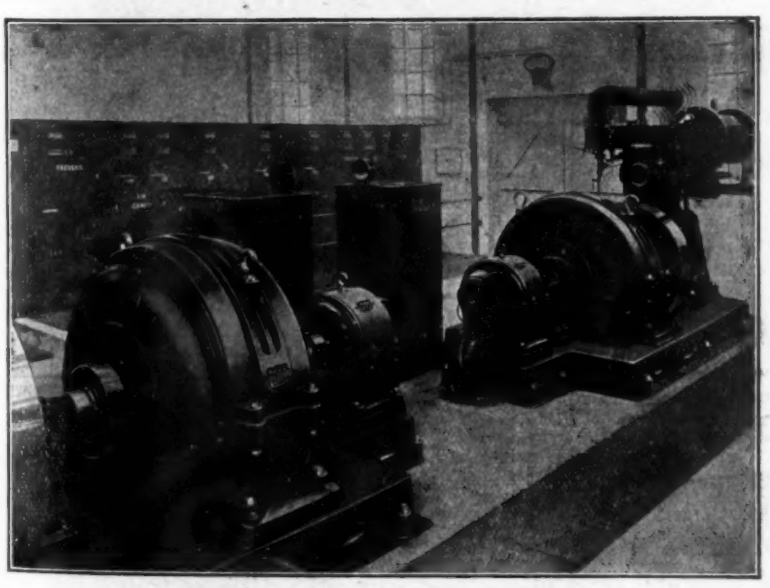

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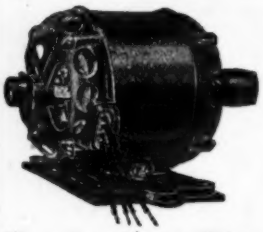

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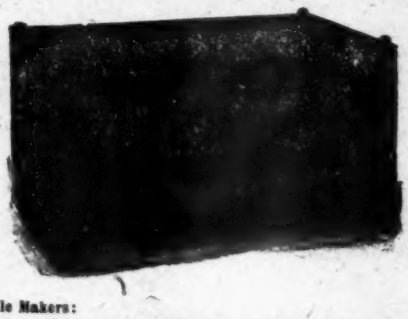

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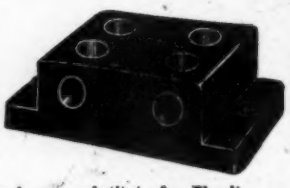

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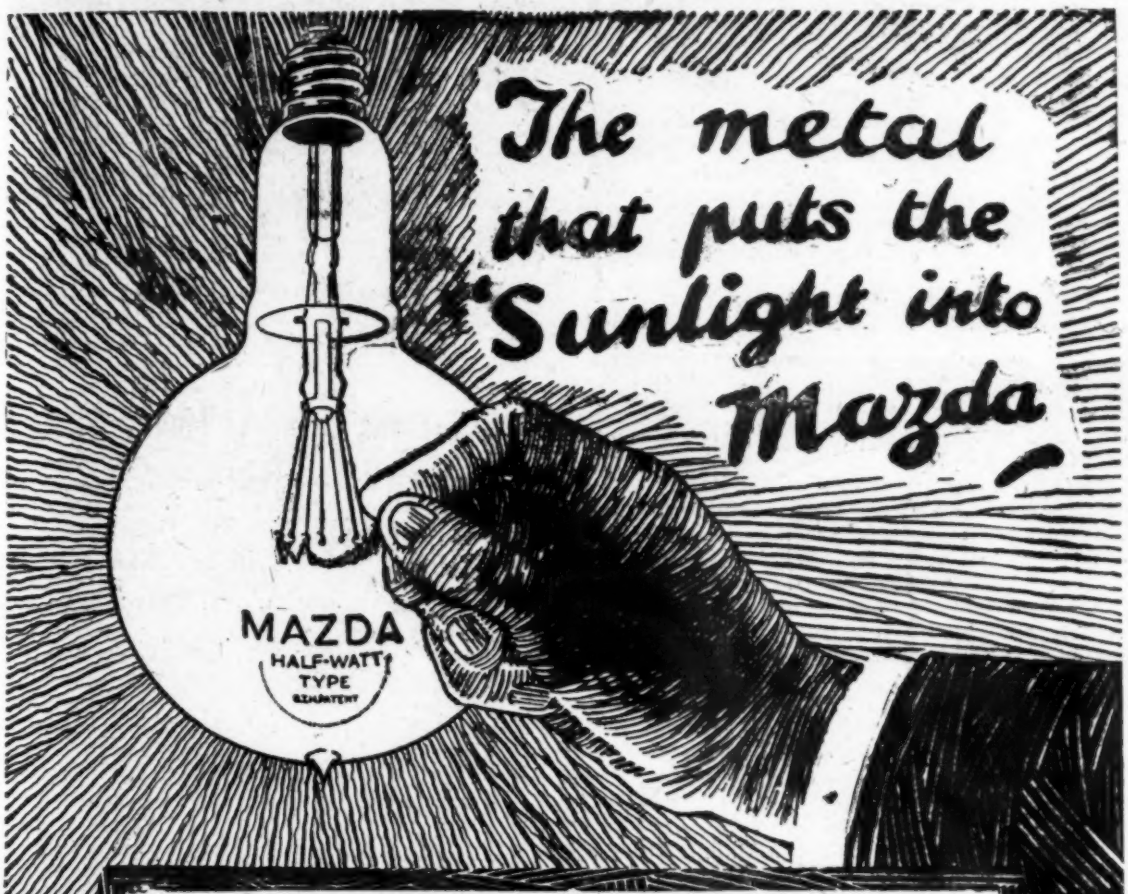

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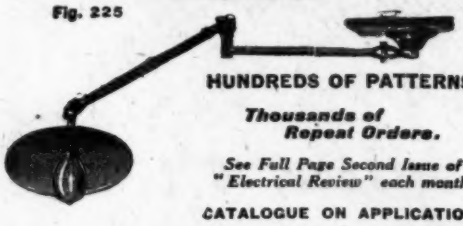
Fig. 225



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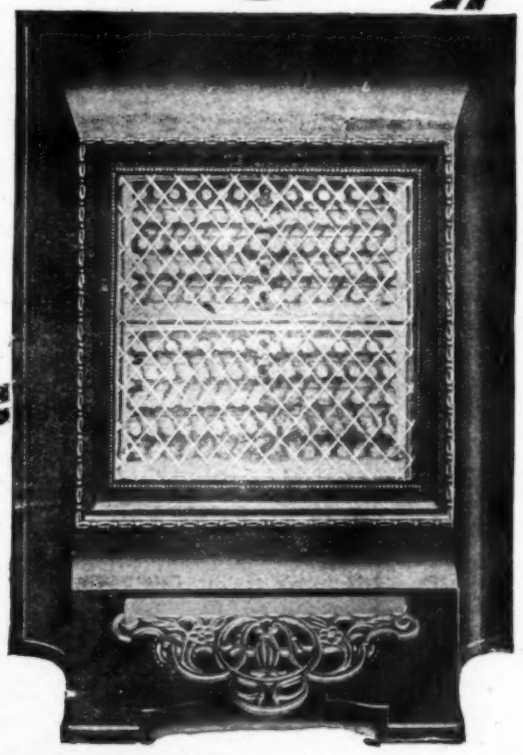

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"I consider the book one of the finest Diaries I have had the privilege to possess, and consider it a *sine qua non* to all electrical engineers throughout the world."—A. R. HILL, Electrical Engineer, 10, Power Station, Workington Iron and Steel Co., Ltd., Lowca, Whitehaven.

"Remarkably good value and very well arranged. I am much pleased with it."—D. ELSON, Electricity Dept., L. & N. W. Ry. Co., North Wall, Dublin.

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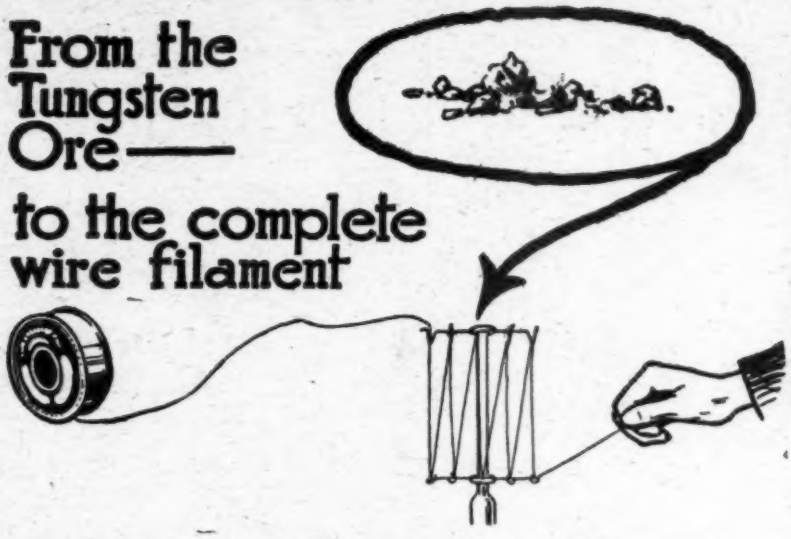

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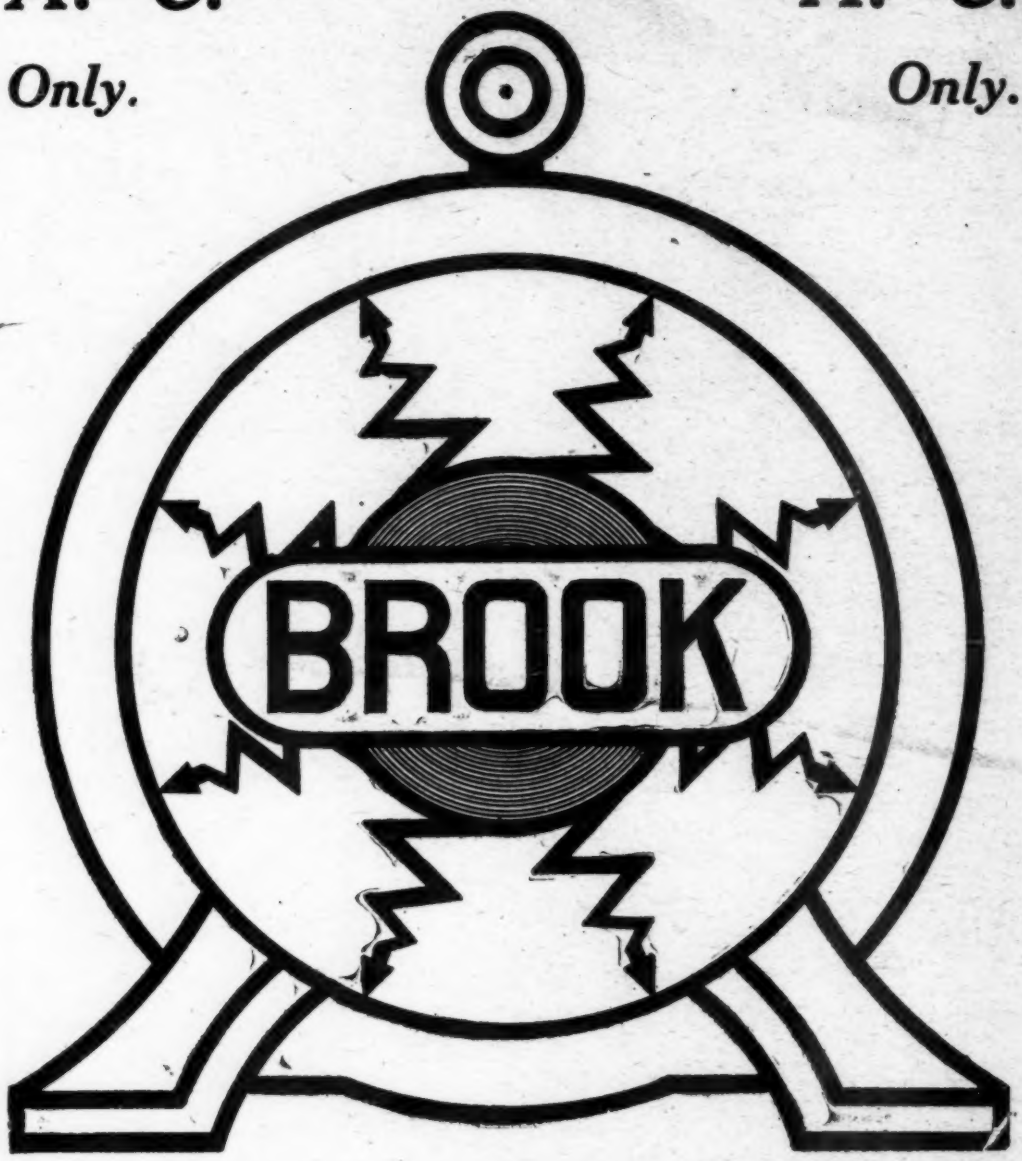

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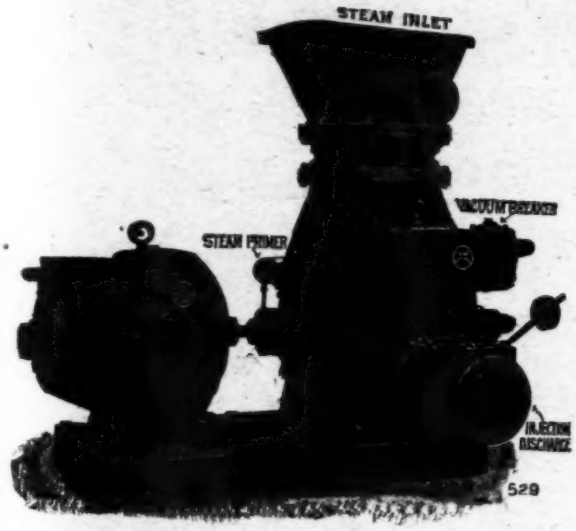

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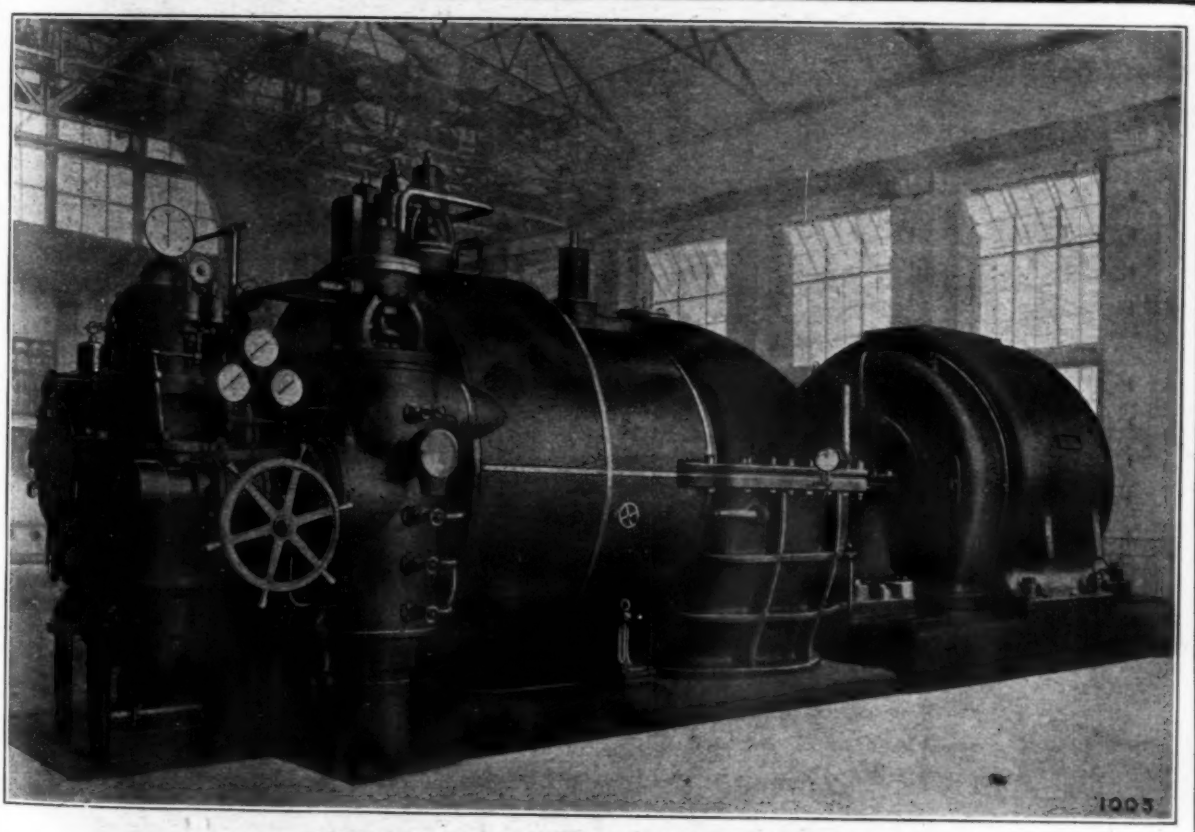

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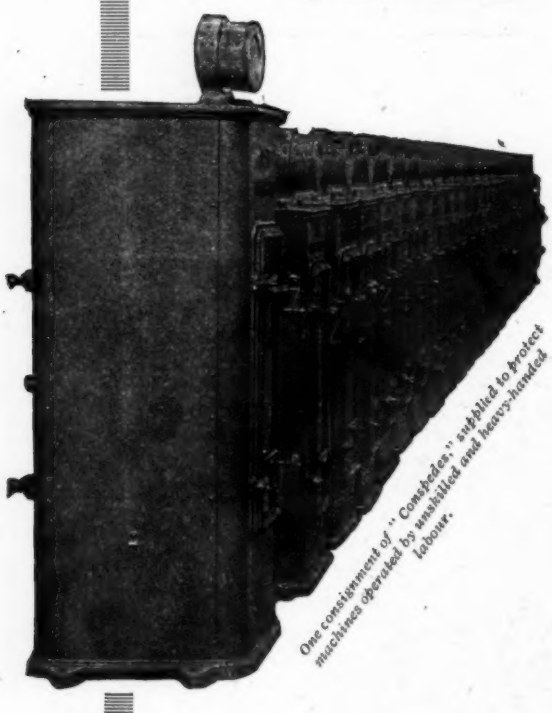

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British Trade Marks Applications.—Below is given a summary of the recent applications for British trade marks in connection with the electrical industries :—

Infuselax, No. 384,471, Class 50.—Electrical insulating preparations made of synthetic resin. Thomas Howse, Ltd., Union Works, Union Street, Smethwick, July 24th, 1918. (To be associated.)

Falksley, No. 383,964, Class 6.—Electrically-operated machinery for controlling curtains, lights, and for similar purposes. Flaconbridge & Lewsley, electrical engineers, 114, Mansfield Road, Nottingham, June 18th, 1918.

Cosmos, No. 384,454, Class 8.—Oscillation valves, thermionic valves, amplifiers, and similar devices, all being for use in wireless telegraphy and telephony. The British Westinghouse Electric and Manufacturing Co., Ltd., 2, Norfolk Street, Strand, London, W.C., July 23rd, 1918. (To be associated.)

Phœnix-Bradford (design), No. 384,468.—Electrical machinery of all kinds included in Class 6. Phœnix Dynamo Manufacturing Co., Ltd., Thornbury Works, Bradford Old Road, Bradford, July 24th, 1918.

Formax, No. 382,796, Class 50.—Electrical insulating materials, consisting of fabrics of various kinds, coated or otherwise treated with an insulating medium. George Schultz & Co., Ltd., 10, Arthur Street, London, E.C., April 6th, 1918.

Letter "P" in design, No. 385,225, Class 6.—Electromotors, dynamos, and aircraft. Portholme Aircraft Co., Ltd., St. John's Street, Huntingdon, September 16th, 1918.

Alumel, No. 385,156, Class 8.—Electric Resistance Elements. Hoskins Manufacturing Co., 453, Lawton Avenue, Detroit, U.S.A., September 11th, 1918. (To be associated.)

Silver King, No. 384,322, Class 13.—Sparking plugs for internal combustion engines. Arthur T. Ellis & Harry A. Hands, 129, Castelnau, Barnes, July 16th, 1918.

Mira, No. 385,102, Class 6.—Dynamos. Mortimer A. Codd (trading as the High-Tension Co.), 62-4, Belvedere Road, London, S.E., September 7th, 1918. (To be associated.)

Electric Plant Destroyed.—According to newspaper reports, during a fire in the plating shed at Harland & Wolff's yard at Belfast, on Monday, a "special electric plant" was destroyed.

Disabled Men and Workmen's Compensation Insurance.—Under a scheme, of which particulars were issued by the Home Office on Monday, it is provided that where an employer employs disabled soldiers, sailors or airmen (all men receiving disability pensions are "disabled" men in this connection), the Government will be responsible, through an arrangement with the insurance companies, for any additional losses incurred owing to any greater liability of such disabled men to accident in the course of civil employment.

Trade Announcements.—Messrs. Tredegars, Ltd., announce that, owing to large extension of their business during the past 12 months in London and the provinces, it has been found necessary to enlarge their premises and increase their staff. We understand that they have carried out very big supply contracts for the French and English Governments, and have now in hand contracts recently placed. The wholesale and export department is a separate concern to Tredegars, Ltd., of Brook Street, and is under the entire supervision of their manager, Mr. A. W. J. Bedbrook, and staff.

The London office of Messrs. Richard Garrett & Sons, Ltd., which has hitherto been conducted by Mr. W. J. Marshall, one of the directors, will henceforth be in charge of Mr. G. P. Mair. Mr. Marshall is taking over administrative duties at the works at Leiston, Suffolk.

The Concordia Electric Wire Co., Ltd., have now removed from Cricklewood Lane, London, to Trent Mills, New Sawley, Derbyshire, where they have equipped an extensive modern factory. For the convenience of London and suburban customers, they have opened an office and showroom at 155, Victoria Street, S.W. 1, under the management of Mr. R. W. Belcher, and a stock will be kept there.

Electric Lamps in Italy.—According to a *Daily News* report from Milan, electric lamps have been declared a State monopoly in Italy.

Book Notices.—*Transmission of Heat Through Heavy Building Materials.* By A. H. Barker, B.A., B.Sc., Whit.Sch., and M. Kinoshita, M.Sc. (Lond.). Bulletin No. 2 of the Department of Heating and Ventilating Engineering, University College, University of London.—This is the report of a research carried out for the Research Committee of the Institution of Heating and Ventilating Engineers, with the aid of grants from the Department of Scientific and Industrial Research. The subject offered an almost virgin field—a very large one, too—which might even be described as a trackless waste. New methods had to be devised for conducting the tests, and a great variety of conditions had to be taken into account—an obvious fact when one remembers that the experiments included measurements subject to the kaleidoscopic variations of the atmospheric conditions in our capricious climate. The report details the conditions, describes the methods and the ingenious apparatus evolved by the author and his assistant, and gives details of the results obtained. Mr. Barker provisionally concludes that the generally-accepted coefficients for heat transmission err considerably on the low side; that Rietschel's coefficient for an unplastered brick wall under laboratory conditions is about 10 per cent. low; but that the average mean value of the transmission coefficient of a plain brick wall matchboarded inside is 0·25 (10 per cent. below Rietschel's result). From the data obtained, a series of values of K for different thicknesses of wall is tabulated; it appears that a 9-in. wall, matchboarded, is equivalent to a wall more than 21 in. thick without matchboarding. The experiments are being continued.

"Science Abstracts." Sections A and B. Vol. XXI, Part 10. October 31st, 1918. London: E. & F. N. Spon, Ltd. Price 1s. 6d. net each.

Bankruptcy Proceedings.—James Brockie, mechanical engineer, Forest Hill, Kent.—Application for discharge adjourned *sine die* on October 18th.

Catalogues and Lists.—Messrs. Ward & Goldstone, Sampson Works, Salford, Manchester.—List giving description, with illustrations and prices, of their Isolex replacement fuse, a new type just introduced.

Bastian Electric Co., Ltd., 185, Wardour Street, London, W. 1.—Attractive and useful folder giving illustrations, prices, and brief particulars of a number of types of their "Real Red Heat" electric fires, "Pygmy" heating sets, tube furnaces, drying ovens, hot-plates, &c. Copies of this list, also of a Bastian picture postcard, can be obtained on application.

Non-Ferrous Metal Industry Act.—A further list of licences granted appears in the *London Gazette* for November 26th.

Restrictions Removed.—On and after December 1st, 1918, all restrictions as to the sale or purchase of calcium carbide will be removed, subject to a maximum price to consumers of £40 per ton for quantities of 1 cwt. and over (granulated 10s. per ton extra). No application for the use of this material or returns of stock need be made to the Ministry of Munitions after the above-mentioned date. It is anticipated that supplies are available for all purposes, and will be distributed through the ordinary trade channels, but should the exigencies of the shipbuilding trade demand it, the Government reserves the right to give preferential deliveries.

Liquidations.—A.E.G. Electric Co., Ltd.—Liquidator, Mr. M. Jenks (without committee of inspection), 6, Old Jewry, E.C. 2, appointed October 19th.

Telephone Co. of Egypt, Ltd.—Winding up voluntarily. Liquidator, Mr. A. W. Wyon, 3, Frederick's Place, E.C. Meeting of creditors, December 9th. Claims by December 11th.

Ilkeston Motor and Electrical Engineering Co., Ltd.—Meeting at Bramley House, Nottingham, on January 1st, 1919, to hear an account of the winding up from the liquidator, Mr. A. Booser.

Demobilisation Notes.—"One-Man Business" men in the Army will be released on the same basis as other men who have places awaiting their return.

Mr. Harry Dubery, Labour adviser of the National Alliance of Employers and Employed, is visiting France to lecture to the troops on industrial matters in connection with demobilisation. His tour is arranged by the Educational Section of the War Office.—*Times.*

The Trade of Manchester.—The *Financial Times* states that Manchester is to undertake a big publicity campaign to attract trade to the port. The ship canal facilities are to be improved by the erection of new warehouses and the installation of electrical plant.

LIGHTING AND POWER NOTES.

Australia.—Tasmania.—Water Power.—In August last the State Premier stated that the Government's hydro-electric policy was being developed as quickly as possible, and it was proposed to ask Parliament for a further large sum for the purpose. It was also hoped to launch a big scheme on the West Coast. The Government was already committed to large contracts for the supply of power, to meet which it would be necessary to obtain all the power possible from the Great Lake, and also to connect it up with the Arthur Lake. The Minister of Lands stated that, when fully developed, the Great Lake would yield 30,000 H.P., and the Arthur Lake 55,000 H.P. It was proposed to convey power from the Great Lake to Launceston without waiting for the Arthur Lake scheme, and Parliament was to be asked for permission to erect the transmission line. Up to that time the Department had spent £600,000, and it was estimated that the total expenditure would be two or three million pounds. The power available from the Great Lake in August was 7,000 H.P., of which the Electrolytic Zinc Co. used 4,000 H.P., at £3 10s. per H.P.; Hobart City Council, 1,060 H.P., at £4 7s. 6d. per H.P.; and the Hydro-Carbide Works, 3,500 H.P., at £3, less 5s. per H.P. The Department also supplied 58 other power consumers with 1,170 H.P., making a total of 9,700 H.P., exclusive of lighting.—*Industrial Australian.*

Burnham-on-Sea.—Price Increase.—The U.D.C. has decided to raise the price of electricity for lighting, as from December 25th last, to 7d. per unit, with a further advance to 8d., as from September 29th last; and for power to 4d. per unit.

Bury.—Proposed Linking-up.—The Electricity Committee has been in communication with the Lancashire Electric Power Co., with a view to the linking-up of the two systems at Radcliffe, for the purpose of affording the necessary supply for power, until the extensions to the Bury works can be carried out. The matter has been left to the Works Sub-Committee.

Bradford.—Wages.—In response to applications from the Bradford Corporation Employés' Joint Committee and the National Union of General Workers, for a 10s. per week increase upon the present war bonus rate, the War Wages Committee of the City Council decided on Monday that, as from December 1st, the war wages of those employés not receiving the 12½ per cent. bonus shall be, in the case of men, 30s., and in the case of women 21s. on pre-war rates. This is equivalent to an increase of 5s. to the men and 3s. to the women.

Coventry.—Price Increase.—The Electricity Committee has decided to raise the charge for electricity for lighting by 20 per cent., and for power by 33⅓ per cent., for a period of three months.

Dublin.—L.G.B. Inquiry.—Last week an inquiry was held, by Mr. A. D. Price, into the application of the Corporation for sanction to borrow from the Bank of Ireland such sums as the Board might certify to be necessary for the working of the electricity undertaking from time to time. It was stated to be necessary for the Electricity Committee to have £50,000 or £60,000 at its disposal, upon which it could draw to pay working expenses.

Wages.—A recommendation that the wages of members of the Irish A.E.S.E. employed by the electricity department whose salaries did not exceed £250 per annum be granted the same war bonus as has been granted by the Committee on Production to members of the E.T.U. was defeated at a meeting of the Corporation, and was referred to the E.S. Committee and the Law Agent for a report.

The Port and Docks Board has decided to review the whole question of the use of electricity at the docks, and the engineer is to draw up a report on the matter.

Folkestone.—Price Increase.—The T.C. has appointed a Sub-Committee to consider the advisability of taking action relative to the application of the Electricity Supply Co. to the B. of T. for consent to raise the price of electricity from 7d. to 8d. per unit.

Glasgow.—Dalmarnock Power Station.—Members of the Glasgow Council's Electricity Department some time ago inspected the new power station which is in process of construction at Dalmarnock. In an "Official Note" issued in connection with the visit, to which we are now permitted to refer, it is pointed out that 45 acres of ground in all have been acquired at the site of the station, at a total cost of £63,100. The work for the inlet and outlet water culverts and the foundations was completed at the end of 1916, the total cost being £83,000. The inlet water supply is in duplicate. The previous decision to suspend during the war erection of the superstructure and installation of plant was rescinded in 1916, and contracts were placed for buildings comprising one-half of the generating station, one half of the switch house, two boiler-houses, and complete coal storage. These contracts amounted in all to £120,000. Since April, 1917, orders have been placed for four 18,750-kw. (25,000-h.p.) turbo-alternators and condensing plant, together with eight boilers and accessories necessary for the complete equipment of one boiler house. A contract has also been placed for a complete coal-handling plant. The buildings inspected are laid out as follows:—The turbine room, 230 ft. long by 75 ft. broad, is the main building; on the north side of the turbine room, and at right angles to it, there will be two boiler houses, each to contain eight boilers. On the south side of the turbine room the switch house is being erected. This building will contain the main switchgear as well as 20,000-volt transformers. The coal store covers 2½ acres, and is capable of accommodating 60,000 tons of coal. The walls and half the roof of the first half of the turbine room are completed, and one boiler house is two-thirds completed. The switch house is erected to the ground floor only. Owing to restrictions on the use of steel, reinforced concrete has been used throughout in place of steel girders. Ample railway sidings for the delivery of coal are provided; the coal-handling plant has been designed for the rapid and economical handling of an amount of coal sufficient for the ultimate maximum requirements of the station. The boiler house is a three-storey building; the basement will contain forced-draught fans, and give space for the entry of trucks for the removal of ashes; the first floor will accommodate the boilers and accessories, and the second floor will house economisers and induced-draught fans. The turbine room is a two-storey building, the basement containing condensing plant and the first floor housing the turbo-alternators and accessories. The switch house being a separate building, will enable the operating staff to perform its duties undisturbed by the noise of rotating machinery. A workshop is erected alongside of the first boiler house at the end of the turbine room. The workshop crane will run out over the railway track for the lifting of heavy machinery from the railway into the turbine room, where the turbine-room crane will deal with it. The machinery and accessories on order will cost £860,000.

Harrow.—Street Lighting.—About one-ninth of the street lamps were to be lit at the beginning of this week, the number being curtailed owing to the shortage of labour. No lamps at all have been lit throughout the war.

Lighting Regulations.—By an Order in Council made on Monday, it is provided that Regulation 11, enabling the Home Secretary to make orders with regard to lights, does not disappear. All orders made under it, however, have been cancelled, except the orders relating to lights on vehicles and the Advertisement Lights Order.

India.—Namtu Mines.—The Burma Mines, Ltd., is now erecting at Namtu, Northern Shan States, Burma, a mill for concentrating the lead, silver, and zinc ores of these mines. The mill is being erected under the supervision of American engineers and mechanics, and American machinery is employed throughout. The ore is brought out of the mine through a tunnel 2 miles long, and electric locomotives will be used to haul the mine cars through the tunnel to large storage bins at the portal. The mill will have a capacity of at least 700 tons per day, and is laid out so that its capacity can be extended to 3,000 tons per day. The present 700-ton-a-day plant will cost approximately $1,000,000, of which $200,000 has already been spent in the U.S. for electrical machinery and supplies. The Burma Mines, Ltd., an operating firm controlled by the Burma Corporation, is by far the largest mining corporation operating in Burma, and the Namtu Mine is one of the largest in the world. Considerable American capital is supposed to be interested. The resident manager and his assistants are Americans, and 33 other American engineers, superintendents, and mechanics are employed at Namtu.

Killarney.—E.L. Charges.—At a meeting of the U.D.C., it was pointed out that the Electricity Company was entitled to charge 10s. per quarter, and it was suggested that if the company persisted in this charge, the Council should exercise its right to purchase the undertaking next July.

Kilmarnock.—Proposed Extensions.—The Director of Electric Power Supply has agreed to the proposed extensions at the Corporation electricity works, including the installation of a 5,000-kw. generator.

Kingston-upon-Thames.—E.L. Failure.—Owing to the failure of the Corporation electricity supply on Tuesday evening, business houses had to close down.

London.—Hampstead.—Loan Sanction.—The L.C.C. Finance Committee has recommended that the application of the Hampstead B.C. for a loan of £8,287 for plant at the electricity works be sanctioned.

Southwark.—Price Increase.—The B.C. is asking for powers to increase the price of electric power from 8d. to 1s. per unit.

Kensington and the E.T.U.—There was an unexpected sequel to the action of the management of the Royal Albert Hall in cancelling the letting of the hall for a Labour Conference which had been arranged for last Saturday night. Mr. Hilton Carter, manager of the hall, stated in a letter that, in view of the demonstrations of a revolutionary character that took place at the meeting there on the 3rd and 14th inst. on the part of Mr. Lansbury's supporters, he did not think his Council would be justified, in its own interests, in allowing the meeting arranged for the 23rd inst. to take place in the Royal Albert Hall. By way of protest, representatives of the Kensington Branch of the Electrical Trades Union, supported by the Central Organisation, at 10 o'clock on Saturday morning removed a paving stone outside the hall and cut off the electricity supply at the main. Mr. W. J. Webb, secretary of the E.T.U., stated that the move was decided on at a special meeting on Friday night. He said that the men of the Kensington and Knightsbridge power station would not allow the main to be re-connected, and if the Albert Hall Council attempted to get it done the whole of the electricity supply in London would be cut off. According to the daily Press, Mr. W. J. Webb is reported to have said that "our men are incensed that the Albert Hall Council should have set itself up as censor of public opinion, and would not allow the Albert Hall to benefit from their labours until the Council was prepared to let them express their opinions on the great questions of the day, just as it permitted the meetings of other recognised political organisations." Eventually, at the request of the Government, the Council of the hall reconsidered its decision, with the result, that members of the E.T.U. proceeded to re-connect the main, and the meeting is to be held to-morrow.

Oswestry.—Fire.—The electric generating station at Park Hall Camp has been destroyed by fire said to have been caused by overflowing oil coming in contact with heated exhaust pipes.

Somerset.—Electricity in Agriculture.—The report of a committee on rural development has been adopted by the County Council. The report included a scheme for the establishment of electric generating stations at Radstock and Dunball. The committee considered it important to the prosperity of counties like Somerset that a cheap supply of electric power should be available. The small company which supplies Wedmore is of the greatest benefit to the district served, and supplies power for pumping, apple mills, separators, chaff-cutters, &c., on the neighbouring farms.

Stretford.—Proposed Purchase.—The U.D.C. has notified its intention to introduce a Bill next session for the purchase of the undertaking of the Trafford Power and Light Supply Co. within the area of the U.D.C. and the Salford Corporation, and to extend the area of supply so as to include the parish of Davyhulme.

Taunton.—Wages.—The T.C. has deferred consideration of an application of the E.P.E.A. for increased wages for engineers employed by the Council, pending the receipt of further information on the subject from the I.M.E.A.

Electric Cooking.—The Electricity Committee reports that the electric cooking equipment at the National Restaurant is giving every satisfaction, and has proved that more portions can be obtained from a joint cooked by electricity than by any other method.

TRAMWAY AND RAILWAY NOTES.

Canada.—Toronto Tramways.—We learn from the Toronto *Electrical News* that the operating situation on the Toronto system has apparently become unmanageable from the company's standpoint and uncomfortable for the patrons. The plain fact appears to be that the company has not enough employés to man the cars, and has trouble with those it has. Quite recently an effort was initiated to train young women as conductors, but the "Union" threatened to strike, and apparently the management have thought it best to drop the plan. Overcrowding at rush hours, both on the company and city lines, has reached a climax, and there is no evidence of relief in sight. The policy of the city as regards the company is, and always has been, absolutely disjointed, so that the sum total of these spasmodic efforts is to embarrass the company's operations.

Electric Vehicle Progress.—The Southend T.C. proposes to purchase a two-ton Edison wagon for the tramway department, at a cost of £1,242; the Gillingham T.C. is considering the purchase of an electric vehicle for the collection of house refuse.—*Tramway and Railway World.*

London.—Collision.—During the fog last week an electric train ran into a London and South-Western steam train at Wimbledon, the locomotive being derailed. Beyond a shaking, the passengers escaped injury. The mishap added to the delay caused by the fog.

L.U.T. Fare Increase.—From Monday, December 9th, the fares on the London United Tramway Co.'s services are to be increased to 1d. per mile, with a minimum fare of 1d. This will raise the fares to about double what they are at present.

Wages.—The Executive Council of the N.U.R. has announced that, in view of the termination of the war, it has decided to withdraw the truce entered into with the railway companies and the Government, and to enter into negotiations with regard to the national programme adopted at the Leicester Conference.

Application is being made for an advance of war wages to women employed in railway shops.

New Zealand.—Otira Tunnel.—The headings of the Otira tunnel were joined in August. The tunnel is 5 miles 25 chains in length, and has been under construction since May, 1908. Owing to scarcity of labour and materials it cannot be completed for another two years. It will be operated electrically.

Richmond.—Derailment.—Traffic on the London and South-Western Railway was considerably delayed, on Monday, between Richmond and St. Margaret's owing to the derailment of a goods engine.

United States.—"Skip-Stop System."—The U.S. Fuel Administration states that the saving of coal in 24 States, during six months' operation of the "skip-stop" system on the street railways, was at the rate of 687,122 tons per annum. Very little complaint has been made against the system, which has increased the speed and improved the service; the saving in electric power consumption was 1 per cent.—*Electrical Review*, Chicago.

Uruguay.—Tramway Competition.—The action brought by the Commercial Electric Tramway Co., of Monte Video, for damages for losses caused through the competition of the State omnibus service, has been decided in favour of the company, and the omnibuses are to be withdrawn. The amount of the damages is to be determined in accordance with the Civil Code.—*Review of the River Plate.*

TELEGRAPH AND TELEPHONE NOTES.

Belgium.—Ordinary private telegrams can now be accepted for the liberated part of Belgium at sender's risk as to delay and censorship.

Cable Censorship.—From an Order in Council made on Monday it appears that the censorship of foreign Press cablegrams is to remain in force until the conclusion of Peace.

China.—The Marconi Wireless Co. has completed an agreement with the Government of China for the erection of wireless stations in different parts of China. The negotiations were carried on and concluded with the knowledge and approval of the British Government. They were undertaken when the authorities at Pekin refused to sign a proposed agreement with a Danish wireless company on the ground that German interests were at the back of it.—*Daily Dispatch.*

Denmark.—The Danish Telegraph Office and the Great Northern Telegraph Co. have granted permission for all British prisoners, both civil and military, to send cables home at 25 per cent. of the ordinary rate.—*Daily Telegraph.*

Russia.—The telegraph apparatus business in Russia before the war was largely in the hands of Messrs. Siemens and Halske. The chief buyers were the Government Telegraph Departments and the railways. The Russian Siemens & Halske Co. has, since the war began, put down a large, well-equipped works at Nijni Novgorod for the manufacture of telegraph and telephone apparatus. The works were hardly in full operation when the reign of anarchy began. The Moscow Telephone Manufacturing Co. had also just equipped works in Moscow for the manufacture of telegraph and telephone apparatus, but as it was at these very works that the Bolshevik Red Guards were first formed for the *coup d'état* of November last year, it is hardly probable that much remains of the works organisation.

The telephone business in Russia is almost entirely in Swedish hands, through the Ericsson companies, which had a very large works in Petrograd, and which also controlled the telephone stations of Petrograd and Moscow, and other large towns. The Moscow telephone system was unquestionably one of the finest in the world, and until January, 1917, it was controlled and managed by Swedish engineers. During the Bolshevik bombardment in November last the entire system was "burnt out" by someone maliciously connecting the 220-volt A.C. mains on the operating boards.—*T. and T. Age.*

Wireless Press Service.—From Sunday next the wireless Press service between London and America will be resumed. Some of the Marconi stations, which have all been under Government control during the war, have now been released, and this will make the new service possible.

CONTRACTS OPEN AND CLOSED.

OPEN.

Bootle.—Corporation. Supply of ½-watt lamp street lighting equipment (4 miles) for tramway routes. Mr. T. D. Clothier, Borough Electrical Engineer.

Enniskillen.—December 1st. Sligo, Leitrim & Northern Counties Railway Co. 12 months' supply of telegraph material. Mr. J. Duff, Secretary.

Manchester.—November 29th. Three-phase, 6,600-volt sub-station switchgear. Mr. F. E. Hughes, Secretary, Electricity Department, Town Hall.

Spain.—Tenders have just been invited by the municipal authorities of Pruna (Province of Seville), for the concession for the electric lighting of the town.

Walsall.—December 5th. Electricity Supply Department. One 500-kw. rotary converter equipment. See "Official Notices" November 8th.

CLOSED.

Government Contracts.—The undermentioned contracts have been placed during October, 1918:—

War Office.

Cable Drums.—W. Goodyear & Sons, Ltd.; H. Heaton & Sons, Ltd.; W. Makinson & Sons; A. Wiseman.
Generating Sets.—Austin Motor Co. (1914), Ltd.; Keighley Gas & Oil Engine Co., Ltd.
Motors, &c.—E. Brook, Ltd.; Electric Construction Co., Ltd.
Insulating Tape.—British Rubber Manufacturers, Ltd.; Connolly Bros., Ltd.; Hooper's Telegraph & India-Rubber Works, Ltd.; India-Rubber, Gutta-Percha, &c., Co., Ltd.; Johnson & Phillips, Ltd.; Siemens Bros. & Co., Ltd.
Graphite.—Graphite Products, Ltd.
Iron and Steel Wire.—W. Bain & Co., Ltd.; J. Miller & Co. (Liverpool), Ltd.; F. A. Power & Sons; J. Rigby & Sons; Rylands Bros., Ltd.; J. Shipman & Co., Ltd.; Standard Wire Co.; D. F. Taylor & Co., Ltd.

General Post Office.

Protective Apparatus.—British L. M. Ericsson Manufacturing Co., Ltd.
Telegraphic Apparatus.—Gell Telegraphic Appliance Syndicate, Ltd.
Telephonic Apparatus.—British L. M. Ericsson Manufacturing Co., Ltd.; Peel-Conner Telephone Works, Ltd.; Western Electric Co., Ltd.
Testing Apparatus.—Evershed & Vignoles, Ltd.
Bolts.—Guest, Keen & Nettlefolds, Ltd.
Submarine Cable.—Telegraph Construction & Maintenance Co., Ltd.
Telegraphic and Telephonic Cable.—I. Frankenburg & Sons, Ltd.; W. Gaipel and Co., Ltd.; Henley's Telegraph Works Co., Ltd.; New Gutta-Percha Co., Ltd.; Siemens Bros. & Co., Ltd.; Telegraph Construction & Maintenance Co., Ltd.; Western Electric Co., Ltd.
Leclanche Cells.—Siemens Bros & Co., Ltd.
Induction Coils.—Western Electric Co., Ltd.
Switchboard Cords.—London Electric Wire Co. & Smiths, Ltd.
Stoneware Ducts.—Albion Clay Co., Ltd.
Insulators.—Bullers, Ltd.
Laying and completing a line of ducts in Long Acre, Drury Lane, and Great Queen Street, W.C.—G. J. Anderson.
Platinum and Gold-Silver Alloy.—Johnson, Matthey & Co., Ltd.
Cable Distribution Plugs.—British Insulated & Helsby Cables, Ltd.
Insulated Tails.—London Electric Firm.
Telephones.—British L. M. Ericsson Manufacturing Co., Ltd.
Bronze Wire.—F. Smith & Co. (incorporated in the London Electric Wire Co. and Smiths, Ltd.); Shropshire Iron Co., Ltd.
Tinned Copper Wire.—British Insulated & Helsby Cables, Ltd.

H.M. Office of Works.

Engineering Services.—Installation of lift, Treasury Buildings, Whitehall.—Waygood-Otis, Ltd.

India Office.

Cells.—General Electric Co., Ltd.
Copper Plates.—T. Bolton & Sons.
Copper Wire.—Elliott's Metal Co., Ltd.
Dynamos.—J. Stone & Co., Ltd.
Insulators.—Bullers, Ltd.
Wireless Gear.—Marconi's Wireless Telegraph Co., Ltd.

Belgian Congo.—Messrs. Dick, Kerr & Co., Ltd., have received an order for two 5,000-kw. turbo-alternator sets and condensing plants for the Union Minière du Haut Katanga, who are very large copper producers with extensive mining properties in the Belgian Congo.

The turbines will be of the Willans-Zoelly type, operating on steam at 145 lb. per sq. in. pressure and exhausting into a vacuum of 28 in. (bar. 30 in.), and will carry an overload of 6,250 kw. for two hours. The condensing plants are each designed to deal with 60,000 lb. of exhaust steam per hour and have 10,000 sq. ft. of cooling surface. The turbines will be coupled to Siemens alternators, designed for a normal output of 5,000 kw. at ·9 power factor (5,560 k.v.a.) when supplying three-phase current at 50 cycles and 6,600 volts pressure, and will be capable of carrying overloads of 25 per cent. for two hours, or 50 per cent. momentarily. The ventilating air for these machines will be filtered in dry-air filters of the Premier Co.'s make: the machines will each be fitted with a direct-coupled, 110-volt exciter of the overhung type and will operate in conjunction with an automatic voltage regulator.

Chelmsford.—B. of G. Installing the electric light in the workhouse laundry and the quarters of the master and nurses, £42. Christy Bros. & Co.

FORTHCOMING EVENTS.

Junior Institution of Engineers.—Friday, November 29th. At 39, Victoria Street, S.W. At 7.30 p.m. Social evening.

(Sheffield Section).—Friday, November 29th. At the Cutlers' Hall. Presidential address by Dr. P. Longmuir.

Greenock Association of Electrical Engineers.—Saturday, November 30th. Visit to Coats's Observatory, Paisley.

Society of Engineers (Inc.).—Monday, December 2nd. At 5.30 p.m. At Burlington House, Piccadilly, W. Paper on "Notes on Railway High-capacity Wagons' Wheel Axles," by Mr. H. Kelway-Bamber.

Royal Society of Arts.—Monday, December 2nd. At 5 p.m. At John Street, Adelphi, W.C. Cantor lecture on "Physical Chemistry and its Bearing on Chemical and Allied Industries," by Prof. J. C. Philip.

National Association of Supervising Electricians.—Tuesday, December 3rd. At 7 p.m. At St. Bride's Institute, E.C. Paper on "Cable Layouts for Works and Factories," by Mr. A. F. W. Richards.

Roentgen Society.—Tuesday, December 3rd. At 7.30 p.m. Visit to the Radiographic and Electro-Therapeutic Department, King's College Hospital, Denmark Hill, S.E.

Industrial Reconstruction Council.—Tuesday, December 3rd. At 6 p.m. At the Institute of Journalists, Tudor Street, E.C. Conference on "The Functions of Industrial Councils," introduced by Mr. E. McGegan, of the Ministry of Labour.

Institution of Civil Engineers.—Tuesday, December 3rd. At 5.30 p.m. At Great George Street, S.W. Adjourned discussion on the paper by Mr. R. B. Joyner, on "The Tata Hydro-Electric Power Supply Works, Bombay."

Liverpool Engineering Society.—Wednesday, December 4th. At the Royal Institution, Colquitt Street. At 8 p.m. Paper on "Air Supplies to Boiler Rooms," by Mr. R. W. Allen.

Institution of Electrical Engineers.—Thursday, December 5th. At 6 p.m. At the Institution of Civil Engineers, Great George Street, S.W. Paper on "The Supply of Single-phase Power from Three-phase Systems," by Prof. Miles Walker.

Salford Technical and Engineering Association.—Saturday, December 7th. Visit to the Union Coal Storage Co., Ltd.

London Association of Foremen Engineers.—Saturday, December 7th. At 7 p.m. At the Cannon Street Hotel, E.C. Annual meeting, election of officers, &c.

NOTES.

Erratum.—In the article on "The Grading of Direct-Current Starter Resistances," on p. 484 of our last issue, col. 2, line 16, for "14" read 141 amperes.

Volunteer Notes.—Royal Engineers (Vols.), London Army Troops Companies.—Headquarters: Balderton Street, Oxford Street, W. 1.

Regimental Orders No. 49, by Lieut.-Colonel C. B. Clay, V.D., Commanding.
Monday, December 2nd, to Saturday, December 7th.—Drills as usual.

C. Higgins, *Capt.* R.E., *Adjutant.*

The Welfare of the Worker. — The Institute of Hygiene has decided to form an Industrial Council, representative of both capital and labour and medical experts, as a special section of its General Council. The object of this Industrial Council will be to investigate the diseases and disadvantages under which the worker labours, and to prevent them by promoting and spreading a better knowledge of the hygienic measures necessary.

Technical Books for Men on Active Service.—It may be thought that the approach of peace has removed the necessity of sending technical books to our men on active service. This, however, is an entirely mistaken impression; on the contrary, the need is greater than ever, as the time is at hand when our comrades will be returning to civil life, and they wish to prepare themselves as quickly and as thoroughly as possible for the change. They are fully alive to the importance of efficiency, and they do not expect employers to provide them with work simply because they have done their duty so well in the field. Mr. H. Bligh Hill, of the 78th Labour Group, Tanks C.W.S., B.E.F., who appealed to our readers a few weeks ago for technical books, is conducting a lecture course in electrical engineering for the instruction of the men, who are keen on improving their knowledge, and gives practical demonstrations with plant of 1,500 kw. D.C., which is available. From the syllabus of lectures we observe that besides covering a wide range of technology, he is giving a good deal of attention to the mental and psychological aspects of a sound training, and is combining practical operation with theoretical instruction. Any books that our readers have to spare—or to deny themselves of—will be well employed if they are sent to Mr. Hill.

Institution and Lecture Notes.—Royal Society of Arts.—The arrangements for the session include the following:—

Mondays, December 2nd, 9th, and 16th, at 5 p.m. Cantor Lectures: Prof. James C. Philip, O.B.E., M.A., Ph.D., D.Sc., "Physical Chemistry and its Bearing on the Chemical and Allied Industries."
Wednesday, December 4th, 4.30 p.m. B. S. Rowntree, "Housing After the War."

The following papers are to be read after Christmas:—

Sir Dugald Clerk, F.R.S. (subject later).
Sir Herbert Jackson, F.R.S., "Trueman Wood" Lecture.
B. D. Porritt, M.Sc., "The Rubber Industry: Past and Present."
H. Kelway-Bamber, M.V.O., "Railway Transport in the United Kingdom."
W. L. Hichens, "The Wage Problem in Industry."
J. J. Crowley, D.Sc., "The Use of Electricity in Agriculture in Germany."
Sir Frank Heath, K.C.B., "The Government and the Organisation of Scientific Research."
W. L. Lorkin, "Electric Welding and its Applications."
Prof. J. C. McLennan, F.R.S., "Water Powers and Scientific Development in Canada."
The Cantor Lectures on Monday afternoons are:—Prof. J. C. Philip (as above).
Prof. J. A. Fleming, "Scientific Problems of Electric Wave Telegraphy." Three lectures. February 10th, 17th, and 24th.
Prof. W. A. Bone, "Fuel Economy." Three lectures. March 10th, 17th, and 24th.
Juvenile Lectures, Wednesday afternoons, January 1st and 8th:—
Charles R. Darling, "Liquid Drops and Globules." Two lectures.

Electrical Power Engineers' Association.—A representative and enthusiastic gathering of engineers was addressed by the president, Mr. A. L. Lunn, at Cardiff, on Saturday last, and a South Wales Section of the Midland Division of the E.P.E.A. was formed. A Provisional Committee and secretary were elected, and all inquiries should be addressed to the hon. secretary, South Wales Section, Mr. H. W. Jones, "Adjer House," Church Village, near Pontypridd, South Wales.

A successful mass meeting was held at the Grand Hotel, Bristol, on Friday evening, November 22nd. Mr. A. J. Ostler (sub-station superintendent, Bristol Corporation) presided. In his address Mr. W. Raymond Jones, the National Secretary, sketched the history of the Association and the work that it had accomplished. He emphasised the necessity of staff engineers being organised in view of the threat of the E.T.U. to get all electrical workers into its ranks. A strong Committee was formed to organise the Bristol and West of England power station engineers. The secretary of the new branch is Mr. F. J. Elliott, 3, Glena Avenue, Knowle, Bristol, who will be glad to have inquiries from prospective members who were unable to attend the Bristol meeting.

The Royal Society.—The Royal Society has awarded the Copley Medal to Prof. H. A. Lorentz, of Leyden, For.Mem.R.S., for his distinguished researches in mathematical physics; the Rumford Medal to Prof. Charles Fabry and Dr. Alfred Perot (jointly) for their contributions to optics; and the Hughes Medal to Mr. Irving Langmuir, of Schenectady, for his researches in molecular physics.

Röntgen Society.—A meeting of the Society will be held on Tuesday next, December 3rd, at 7.30 p.m., at King's College Hospital, Denmark Hill, S.E., when there will be a visit to the Radiographic and Electro-Therapeutic Department. Demonstrations of the apparatus will be given. Members of the Institution of Electrical Engineers are cordially invited to be present.

The Engineering Society, at Bradford, last week, discussed reports on "Electric Power Supply in Great Britain" by the Coal Conservation Sub-Committee and by the Board of Trade Committee. The chairman (Mr. Walter Leach) said it was generally admitted that nothing could contribute more to the successful reorganisation of industry than a plentiful and reasonably-cheap supply of electric power. Prof. Charnock, of the Textile Department of the Technical College, opened the discussion, demonstrating the wasteful nature of the processes involved in power production. The views of successive speakers indicated the feeling that the reports were simply the opinions of the members of the Committees, no evidence being adduced in support, and the reports met with opposition. The discussion was postponed until December 16th, when it is hoped that several electrical authorities will be present.

Last week a lecture, illustrated by lantern slides, on "The Application of Electricity at Douglas Castle Colliery," was delivered by Mr. Robert Crawford, the manager, at the Douglas Hall.

Institution of Electrical Engineers.—At the opening of the meeting on Thursday, last week, the President (Mr. Wordingham) briefly addressed the members on the subject of the collapse of Germany and the vindication of the cause of righteousness and freedom, after which a verse of the National Anthem was sung. A vote of condolence with the relatives of the late Mr. Llewelyn Preece was passed. Mr. J. H. Shaw then read his paper in abstract; the discussion is reported elsewhere in this issue.

Mr. Wordingham raised a question as to the most desirable hour at which to commence the meetings, and it was decided to take a postal vote on the subject.

Mr. Shaw's paper was also discussed at the North-Western Centre on Tuesday last.

Fatality.—The Rotherham Borough Coroner held an inquest, last week, relative to the death of Charles Morris (49), electrician's labourer, who was found dead in the Glasshouse Street sub-station of the Corporation electricity works. The widow stated that she went with her husband's breakfast about 9.30 a.m., and discovered that he was dead. He was bending forward, and his head was apparently held up by something against which he had fallen. The mains engineer stated that the pressure was 3,000 volts alternating. Morris had sufficient technical knowledge to know the danger. The man's dinner was found, and it was supposed that death took place the previous day. A verdict of "Accidental death" was returned.

British Scientific Instrument Research Association.—This, one of the earliest Associations formed under the scheme of the Department of Scientific and Industrial Research, has secured premises at 26, Russell Square, W.C. 1, where offices and research laboratories will be equipped. The first chairman of the Association was Mr. A. S. Esslemont, whose recent lamented death has been a severe loss to the Association. The Council has elected Mr. H. A. Colefax, K.C., as chairman to fill the vacancy. The vice-chairman is Mr. Conrad Beck, C.B.E., to whose energy and personal influence is largely due the successful formation of the Association. We are informed that almost all the leading optical and scientific instrument manufacturers are members. The Department of Scientific and Industrial Research is represented by Major C. J. Stewart, Capt. F. O. Creagh-Osborne, R.N., C.B., Mr. S. W. Morrison, O.B.E., Col. R. E. Home, D.S.O., R.A., and Mr. Percy Ashley. The Council has recently co-opted as members of its body the Hon. Sir Charles A. Parsons, F.R.S., and Prof. J. W. Nicholson, M.A., D.Sc., F.R.S. Sir Herbert Jackson, K.B.E., F.R.S., F.I.C., has been appointed Director of Research, and Mr. J. W. Williamson, B.Sc., secretary of the Association.

Parliamentary.—*Royal Assent.*—The following Acts have received the Royal Assent :—

Termination of the Present War (Definition) Act, 1918.
Defence of the Realm (Employment Exchanges) Act, 1918.
Wages (Temporary Regulation) Act, 1918.
Ministry of Munitions Act, 1918.
Local Government Board's Provisional Orders Confirmation Acts (Nos. 2, 3, 7, and 8).
Clyde Valley Electrical Power Order Confirmation Act, 1918.
London United Tramways Act, 1918.

Applications for Powers.—The *London Gazette* during the past week has contained notices of application for the following powers :—

Thames Ocean Wharf and Railway.—New company to construct wharf, railways, and other works, electric generating stations, work railways by steam or electricity, supply electrical energy, &c. (Parliamentary agents, Dyson & Co., 23, Abingdon Street, S.W. 1.)

Manchester.—Corporation. Further works in connection with electrical generating station at Davyhulme.

Leeds.—Corporation. Powers to extend the city to include Middleton ; tramways and electrical powers.

Chepstow.—Chepstow E.L. and Power Co. Powers to extend its supply to the rural district of Lydney.

Tynemouth.—Corporation. Power to construct and run trolley-vehicle system ; agreements with Newcastle-on-Tyne E.S. Co. and Northern Counties Electricity Supply Co. *re* supply of electricity, &c.

Blackpool.—Corporation. Powers to acquire undertaking of Blackpool and Fleetwood Tramroad Co.

Stretford.—U.D.C. Extension of electric supply area ; further powers, &c.

Sheffield.—Corporation. Powers for several new tramway sections.

Stockton-on-Tees.—Corporation. Powers to construct and run new tramways, motor-buses, &c.

Middlesbrough.—Corporation. Powers for new tramways, trolley vehicles, purchase of Imperial Tramways ; agreements with electric supply companies, &c.

Petrol-Electric Vehicles.—The various systems of transmission which are commonly classified as petrol-electric, but most of which ought more accurately to be described as electric or electromagnetic, may, says the *Commercial Motor*, take a more prominent place in the future than they have yet held. Such systems undoubtedly have considerable advantages in connection with road trains and also in connection with passenger services where frequent stopping and starting is necessary. The smooth acceleration given by an electric transmission affords a reason why its opportunity of becoming popular is to be found particularly in connection with omnibus services rather than with goods-carrying vehicles of normal capacity.

The Batti-Wallahs' Anti-German Propaganda.—To-night at 6.30 o'clock, at the Holborn Restaurant, there will be a dinner of the Batti-Wallahs' Society, after which members will discuss the campaign in favour of boycotting German-made goods upon which it is proposed that the Society shall embark in conjunction with the Merchant Seamen's League. The present outline of the scheme is that with the approval of the League an electrical branch should be formed to organise the industry and act as a second line of defence in the League's campaign against the invasion of British markets by German-made goods. After members have had an opportunity of expressing their views in a quite informal way, a Sub-Committee will be appointed. Those who wish to be present at the dinner should 'phone Mr. A. J. Greenly, the Hon. Entertainment Secretary, "Gerrard 7587" ; "Regent 3661."

The E.T.U. and Industrial Councils.—The Manchester *Daily Dispatch* states that a ballot is being taken by the Electrical Trades Union, the United Machine Workers, the Joiners, and semi-skilled and unskilled Unions on a scheme for the formation of a National Joint Industrial Council for the electrical contracting industry. Its object will be to secure the largest possible measure of joint action between employers and workpeople for the development of the industry as a part of national life, and for the improvement of the conditions of all engaged in the industry. Among the more specific objects will be regular considerations of wages, hours, and working conditions, measures for regularising production and employment, consideration of machinery for the settlement of differences, and the establishment of District Councils and Works Committees.

Transport Facilities in the United Kingdom.—The Select Committee on Transport has issued a second report (No. 136 ; price 3d.), containing important statements of opinion. Dealing first with the subject of the railways, the Committee points out that their history records a continuous process of absorption of small undertakings by larger ones, followed by the amalgamation of the latter, the tendency being towards widening the area of operation under a single management, and putting an end to uneconomical competition. The trend is towards the point where a single system will have been established, and "springs from the natural desire of the men who control the railways of the country to carry on the business of railway management in the most efficient and economical manner. This desire is one with which it is impossible not to sympathise. It appears to be inherent in the conditions in which all large-scale modern businesses are conducted, and it is extremely doubtful whether it can, or should, be resisted." During the war the railways have remained under the management of their own directors, subject to the control of a Railway Executive Committee of 12 general managers, unification of management being thus effected without unification of ownership. The high efficiency witnessed in the working of the railways, in spite of the greatly increased demands of the very large Government traffic and the increased volume of both passenger and goods traffic, is attributed by the Committee to the patriotic exertions of all concerned, and it is stated that the British railway service has been superior to that of any of the other belligerent countries. Evidence was given before the Committee by members of the Railway Executive Committee to the effect that if a policy of unification of management, combined with a pooling of assets of the railway companies, were adopted, it should be possible to give the public better service at less cost. The Committee, therefore, considers it desirable that there should be a unification of ownership as well as of management of the main railway systems ; whether the State or one large joint-stock concern owns the railways is regarded as immaterial. This is the only way by which large economies can be effected. Moreover, war conditions and the complete elimination of competition have revolutionised old-established methods of operation, and introduced problems which "seem to require solution by some process of continued unification." Hence the Committee arrives at the conclusion "that the main railway systems of the United Kingdom should be brought under a unified ownership and managed as one system" if the internal transport facilities are to be developed and improved with efficiency and economy, and "with due regard to the interests of the proprietors, the railway staffs, and the general community."

The waterways are unimportant in comparison with the railways, though they possess a total mileage of 4,670 miles, as compared with the railway mileage (first track) of 23,911 miles. During the war they have relieved the railways of a considerable volume of heavy traffic. Further amalgamation of ownership would be advantageous here also. Road transport should be encouraged and extended, especially in agricultural districts, but the Committee has not been able to pursue this subject far.

In Part III of the report the Committee lays stress on the unanimity with which a policy of unification, or, at least, amalgamation, has been advocated by previous Royal Commissions on transport facilities, and considers various methods of organisation, concluding that the organisation of the transport agencies of the country—particularly the railways—cannot be allowed to return to its pre-war position. In Part IV the question of efficient Government supervision and regulation is briefly considered. In Part V it is stated that Mr. A. W. Gattie's company wishes to erect an experimental plant to carry out tests of his system on a practical scale, and the Committee recommends that the company be allowed to raise new capital, amounting to £100,000, for this purpose. The proposals of the Royal Commission on Canals are regarded by the Committee as calling for most convincing evidence of utility before a sum of £38,000,000 is expended on the improvement of property which is at present valued at £6,000,000, but the Committee concludes that outlay on a more modest scale to maintain and improve the existing waterways would be justified. Further inquiry is recommended. In this connection the Committee points out that the national scheme of electricity supply, by profoundly modifying the course of internal coal traffic, will reduce the need for canal transport facilities for coal for power production at inland centres. Part VI deals with the report of a Sub-Committee on Irish waterways and harbours, and recommends immediate inquiry with a view to the speedy execution of a number of valuable improvements, and that the existing unified control should be maintained until new arrangements have been made for the reorganisation of the Irish railways and waterways. The report is accompanied by a number of appendices.

E.T.U. Concert.—The London Station Engineers' Branches of the Electrical Trades Union will hold a concert in aid of their Benevolent Funds, on Thursday, December 5th, at the Surrey Masonic Hall, Camberwell New Road, commencing at 7 p.m.

German Scientists.—Are They Repentant ?—An evening paper says that members of the scientific bodies of the Allied countries have been holding a conference in Paris to decide the attitude to be adopted towards German scientists. The utterances of some of them shortly after the war, concerning England and Englishmen, will not soon be forgotten.

Patent Application.—The Universal Turbine Co. has applied for the restoration of Patent No. 614/13 ("Improvements in fluid pressure or steam turbine engines"), granted to Reginald Haddan. Notices of opposition must be filed before January 27th, 1919.

Openings for British Electrical Trade in Holland.—During the last few weeks we have received communications from several correspondents in Holland and Belgium who have had considerable experience of the electrical business there, and are impressed with the excellent prospects for British electrical manufactures in Holland and the Dutch Colonies. They are disappointed that their previous efforts to induce our firms to establish connections have failed, but they think that now that Germany is thoroughly beaten British manufacturers will be free to enter into engagements. One of our correspondents was for eight years a travelling salesman in electrical lines on behalf of Continental firms, has excellent connections, and knows the requirements of the Dutch market. We shall be pleased to forward letters to him if they are addressed "X," care of The Editor, ELECTRICAL REVIEW.

Our Electrical Duty in Belgium.—Communications reach us from time to time from correspondents who are interested in the future of the electrical industry in Belgium. It appears that while the country was occupied by the enemy, British firms were, more or less naturally, indisposed to make definite arrangements. Probably recent events will have altered that attitude, for we shall require to do all that lies in our power to enable Belgian traders and manufacturers to re-establish their commerce and industry as rapidly as possible. The fear has been expressed to us lately, as it was with considerable force by Belgian electrical men who came to this country soon after the outbreak of war, that Belgium will be driven into the arms of those with whom her people do not desire to trade, unless we are prepared to take a full share in supplying their wants. An alliance between British and Belgian electrical men is greatly to be desired, and the present conditions seem to us to make the time ripe for it. There must be many Belgian electrical engineers and travellers who could efficiently represent British manufacturers there, and we hope that the matter will receive that prompt and serious attention which it deserves.

Appointments Vacant.—Charge engineer, for the Alloa Corporation Electricity Department. See our advertisement pages to-day.

OUR PERSONAL COLUMN.

The Editors invite electrical engineers, whether connected with the technical or the commercial side of the profession and industry, also electric tramway and railway officials, to keep readers of the ELECTRICAL REVIEW *posted as to their movements.*

Central Station and Tramway Officials.—Mr. W. C. BEXON, engineer and manager of the Kilmarnock Corporation electricity works, having been offered an appointment at St. Helens, the Kilmarnock Town Council has increased his salary to £650 per annum, with a three years' agreement, in order to retain his services.

Accrington Tramways and Electricity Committee recommends the T.C. to increase the salary of Mr. H. PILLING, tramways manager, from £400 to £500 per year.

The Coventry Electricity Committee recommends increases in salary as follows:—Mr. G. TOUGH, engineer and manager, from £900 to £1,050; Mr. W. J. MARSTON, assistant manager, from £400 to £500; Mr. E. V. NEWBOLD, chief clerk and accountant, £325 to £400; Mr. J. R. SUTHERLAND, station superintendent, from £325 to £350. The Salaries Committee, after considering the recommendations, have adjourned the matter for further inquiry.

Out of 114 applicants for the post of burgh electrical engineer at Stirling (£300), three have been selected for further consideration.

General.—According to the *Times*, the Academic Council of the Senate of London University last week reported the resignation by Sir Herbert Jackson, F.R.S., in view of his appointment as Director of the British Scientific Instrument Research Association, of the Daniell Professorship of Chemistry attached to King's College. The Senate conferred upon him the title of "Emeritus Professor of Chemistry in the University of London," and appointed as his successor Lieut.-Colonel A. W. Crossley, C.M.G.

Mr. DONALD MCNICOL, for nine years assistant engineer of the Postal Telegraph Cable Co., New York, on October 21st became editor of the *Telegraph and Telephone Age*, in succession to the late Mr. T. R. Taltavall.

Councillor G. A. HASEMER has been elected chairman, and Councillor W. R. POWER vice-chairman, of the Hackney Electricity Committee.

Alderman J. P. SMITH, chairman of the Barrow T.C. Electricity Committee since 1899, has resigned his membership of the Council after 27 years' service.

According to a daily paper, Signor ALBERTO PIRELLI, of the Italian Ministry of Munitions, has arrived in London from Rome.

On Saturday last at the Simplex Co.'s works in Birmingham, Mr. J. F. AVILA was presented with a weather glass by the workpeople and staff. Mr. T. Birkett, who made the presentation, said that the Simplex manufactures had been well maintained during Mr. Avila's administration throughout the war period. He was now returning to take up his old position as London and South of England manager. Mr. Avila, in replying, said he was convinced that the troubles of peace were not likely to be greater than those of war. He was confident from his experience at the works that they would be able to satisfactorily meet the reconstruction period.

Roll of Honour.—Corporal W. FARQUHARSON, R.E., attached R.N.D., an apprentice with Messrs. Lowdon Bros., electricians, Dundee, has been awarded the Military Medal for maintaining communication and laying lines under heavy shell fire. He was awarded the Meritorious Service Medal in June last.

Gunner G. F. BURSCOUGH, who has been killed in action, was employed by Messrs. Dick, Kerr & Co., Ltd., Preston.

Private J. W. NEILD, King's Liverpool Regiment, who has died in hospital at Warrington from pneumonia, was employed by the British Westinghouse Co., Ltd., Trafford Park.

Lance-Corporal E. J. LOWE, Manchester Regiment, who has died of wounds, was employed by the General Electric Co., Ltd., Manchester.

Private H. ANDREW, R.E., who has died from pneumonia, at Chepstow, was a former employé in the Salford Corporation electricity department.

Staff-Lieutenant BASIL EGERTON COOK, who died of pneumonia at the Officers' Red Cross Hospital, Devizes, Wilts., on November 7th, at the age of 22, joined the Army late in 1915, and received his commission in France early in 1916. He was invalided home late in that year suffering from shell-shock and gas poisoning. Subsequently he received a staff appointment, and was engaged on intelligence work at home and abroad. He was an accomplished linguist, and expert at all matters in connection with wireless telegraphy, being stationed at the Army Wireless Station, Devizes, when he died. He was married at Devizes last June. Before the war he went through various departments at the Peel-Conner Telephone Works, Ltd., Salford, and the General Electric Co., Ltd., Manchester, and when he joined the Army was in the engineering and cable department of Messrs. Charles Macintosh & Co., Ltd., Manchester. He was the eldest son of Mr. W. H. Cook, purchasing agent of the Peel-Conner Telephone Works, Ltd., who has been in the employ of the General Electric Co., Ltd., and its associated companies for upwards of 30 years.

Sapper W. E. WALSH, R.E., who has died from pleurisy at a Birkenhead hospital, was an employé of the old National Telephone Co., at Wakefield and Dewsbury.

Driver B. GOUGH, R.H.A., formerly the electrical engineer at the Brighouse Empire, and later with Messrs. Brookes, Ltd., Halifax, has died of pneumonia in France.

Wireless Operator J. W. SUMMERS, R.A.F., has died in hospital at Rouen from bronchial pneumonia.

Private C. ISITT, who has died in France from bronchial pneumonia, was formerly in the employ of Mr. Dunn, electrical engineer, of Ramsgate.

Sergeant H. EASTWOOD, M.M., who has fallen in action, was on the staff of the Yorkshire Electric Power Co., Ravensthorpe.

Gunner S. SMITH, R.F.A., who has died of wounds and gas poisoning, was on the staff at the Rotherham Corporation electricity works.

Private I. B. TAYLOR, Northumberland Fusiliers, who has died of wounds in Italy, was an electrician in the employ of Messrs. Hudson, Scott & Co., of Carlisle.

Staff-Sergeant J. L. FERGUSON, R.F.A., twice mentioned in dispatches, who was killed on November 4th, was electrical engineer at Oakenshaw Colliery, Wellington, Co. Durham. Previously he was engineer at Bradley shops of the Consett Iron Co.

Obituary.—MR. J. LEACH.—Mr. John Leach, of Darwen, who has died at the early age of 32 years, was manager for Mr. Thomas Barton, electrical engineer, Blackburn.

MR. T. SHELLEY.—The death took place on November 18th of Mr. Thomas Shelley, who was for upwards of 40 years on the staff of the Liverpool Corporation tramways.

MR. W. DITCHFIELD.—The death occurred recently, after a brief illness, at the age of 38 years, of Mr. W. Ditchfield, electrician, of Audlem (Cheshire).

OFFICIAL RETURNS OF ELECTRICAL COMPANIES.

English Electrical Co., Ltd.—Satisfaction in full on November 4th, 1918, of debenture dated 1910 and 1911, securing £10,000.

S. C. C., Ltd.—Debenture dated November 11th, 1918, to secure £1,750 charged on the company's undertaking and property, present and future, including uncalled capital and goodwill. Holder: Mrs. E. A. Spencer, The Hall, Harmondsworth, Middlesex.

Globe Telegraph & Trust Co., Ltd. (7,465).—Capital, £5,000,000 in £1 shares (250,000 pref.). Return dated July 16th, 1918. 181,127 pref. and 181,127 ord. shares taken up; £438,115 paid; remainder considered as fully paid. Mortgages and charges: Nil.

Cleveland & Durham Electric Power, Ltd. (89,539).—Capital, £700,000 in 350,000 pref. and 350,000 ord. shares of £1 each. Return dated April 11th, 1918. 333,705 pref. and 157,600 ord. shares taken up; £411,003 paid on 331,335 pref. and 79,068 ord; £80,302 considered as paid on 1,770 pref. and 78,532 ord. Mortgages and charges: £384,900 (including £10,000 issued as collateral security).

General Accessories Co., Ltd. (104,464).—Capital, £3,000 in 1,580 6 per cent. pref., 920 5 per cent. pref., and 500 ord. shares of £1 each. Return dated August 28th, 1917 (filed July 29th, 1918). £1,580 paid; £1,420 considered as paid. Mortgages and charges: Nil.

Ely Gas & Electricity Co., Ltd.—Satisfaction to the extent of £500 on July 31st, 1918, of debentures dated October 1st, 1908, securing £3,900.

CITY NOTES.

Manáos Tramways and Light Co., Ltd.

Mr. G. Watson, presiding at the annual meeting on November 15th, said that the improvement in the net earnings was chiefly due to the better rate of exchange, viz., 13.1d. as against 12d. Summarising the results of the tramways, lighting, and construction departments, he said that the general conclusion from the figures was that the business had neither developed nor diminished to any appreciable extent. As the company had held its own under unfavourable conditions a certain amount of confidence in its future was reasonable. A number of facts were advanced to give support to such expectations. A contract had been entered into with the Manáos Harbour, Ltd., for the supply of electric light and power to the premises and equipment of the harbour, and this would come into effect as soon as certain auxiliary machinery could be shipped out. The value of stores increased by nearly £3,000, chiefly represented by a substantial stock of wood fuel accumulated during the favourable season. This valuable asset would enable them to keep the cost of current generation at its present low level, irrespective of coal prices, which would probably remain high for a considerable period in remote places like Manáos. They could not expect that the cessation of hostilities would be conducive to an immediate resumption of commercial activities or to a sudden return of pre-war prosperity. Quite to the contrary, districts like the Amazon Valley could not be expected to react before an appreciable lapse of time; the disturbance of trade and industry had been too deep, the effect on the population and their activities too serious, to warrant the hope that conditions would once more become normal without passing through a transitory stage of slow and gradual improvement.

British Westinghouse Electric and Manufacturing Co., Ltd.

The adjourned extraordinary general meeting of the preference shareholders relative to the re-arrangement of the share capital was held on Monday, at Hamilton House. Mr. J. Annan Bryce, M.P., who presided, reminded the meeting that it stood adjourned for the purpose of hearing the result of a conference which took place on Thursday last between the financial group which was supporting the company and certain representatives of the preference shareholders. He said that at the conference, after a long discussion, certain concessions were made by Mr. Dudley Docker as representing the financial group, and following upon that, at a conference between certain of the preference shareholders, it was decided to accept the terms. Those terms would be embodied first of all in one important point by an amendment in the resolution as proposed at the last meeting, and as regarded the other important point in a new Article of Association. The first of the concessions that was made was that the dividend, instead of being 8 per cent. simple, should be 8 per cent. cumulative. The second concession was that there should be a right to conversion from preference shares into ordinary at any time with two years after the first allotment of the new ordinary shares. Those were two very important concessions. One very great objection that was raised by Mr. Herbert Smith at the last meeting was that there was no chance under the scheme as proposed of the preference shareholders ever seeing back the £5 which they originally subscribed for their shares. He should say that at present not more than a quarter of those who held the preference shares were original holders—many had come in since at a very low price, and quite a large number would do extremely well under the arrangement as it stood last week. However, it had now been agreed to alter the scheme so that those who paid a low price as well as those who bought high would for two years after the first issue of the new ordinary shares have the right of conversion at the rate of two new ordinary shares for one old preference share at par. He concluded by formally proposing the resolution as follows:—

That this meeting of the holders of the preference shares of the company consents that, as and from the passing by a separate meeting of the holders of the ordinary shares of the company consenting to the modification of the rights and privileges attached to the existing ordinary shares by the conversion of such shares into preference shares ranking *pari passu* with the existing preference shares, the rights and privileges attached to the preference shares of the company shall be modified so that the preference shares of the company shall as from December 31st, 1917, be entitled *pari passu* with the existing ordinary shares to a cumulative preferential dividend, at the rate of 8 per cent. per annum on the amounts paid thereon before any dividend is paid on any new ordinary shares or on the deferred shares of the company and to the repayment out of the assets distributable amongst the members in a winding up *pari passu* with the holders of the existing ordinary shares of the company of £2 a share before any sum is paid in respect of any new ordinary shares or of the deferred shares of the company, but to no further participation in the profits or assets of the company, and hereby consents to the cancellation of any further rights now attached to the preference shares.

Mr. Robert Benson, chairman of the Merchants' Trust, in seconding the resolution, remarked that his company was the largest holders of preference shares, apart from Mr. Dudley Docker's financial group. Proceeding to refer to the conference at which he was present, Mr. Benson said that the scheme as now agreed upon was, in his opinion, a fair and reasonable one all round, and he hoped it would be acceptable to all the preference shareholders. He represented 10,000 shares held by the Merchants' Trust, who were subscribers under the original prospectus, and they had never sold a single share. They had, of course, written down the value of the shares in their books, but their paramount object was to get the whole value back some time if they possibly could, and under the new scheme they would have the chance of doing so. Mr. Dudley Docker and his friends proposed to create five million new ordinary shares behind the preference, and to issue them at par as fast as the necessities of the company for new electrical plant required it. He believed that the field was open for the British Westinghouse Co. to develop as a going concern upon the foundations already laid, especially now that the great German company, with its 50 millions of capital, was not likely to be permitted any longer to undersell British work or British workmen. Reconstruction, he believed, offered the company a great opportunity. Very soon there was to be an issue of one million ordinary shares of £1 each, and the subscription was to be guaranteed at par, without underwriting, by the Metropolitan Carriage Co. That million was to be followed by other amounts as further capital was required. Each million of capital put in behind the preference shares, assuming it was worth 6 per cent. per annum, meant a margin behind them of £60,000 a year, so that when the whole contemplated five million of new ordinary share capital was issued behind them there would be a margin of £300,000 a year to guarantee the 8 per cent. upon their cumulative preference shares. With regard to the right of conversion, the main difference between the two parties at the conference was over the length of the option. He (Mr. Benson) wanted a free option unfettered by time, but they had to go away content with an option for 18 months. Later on however, on the same evening, he saw Mr. Docker again, and that gentleman voluntarily raised the length of the option to two years from the date of the first issue of new ordinary shares, and, in his opinion, it was a fair deal. Mr. Docker, in the offer he had made, showed that he recognised the value of the support even of a minority who were in his power, and he (Mr. Benson) believed that if they all pulled together as a body loyal to the directors and the management, they could contribute to, as well as share in, their success. Mr. Westinghouse was a great inventor and a great mechanic, but he was not a financier, and he lost his money. On the other hand, he was inclined to think that Mr. Dudley Docker was a money-maker.

Mr. Herbert Smith, in supporting the resolution, said that when he attended the conference he went there quite naturally with a desire to surrender as little of their rights as possible, and to get as much as they could in exchange—quite obviously the exact reverse of the attitude of those with whom they had to confer. He could only say that, in his opinion, the arrangement which had been come to was a thoroughly reasonable one, and he thought that, having regard to the fact which Mr. Benson had pointed out, that they were in a minority, they had been received very fairly by Mr. Dudley Docker's financial group, and the terms which they had made were such as they could thoroughly recommend the preference shareholders to accept.

Mr. Varley and other shareholders having spoken in support of the resolution, it was carried with two dissentients.

Subsequently the necessary resolution to carry the scheme into effect was passed at a meeting of the ordinary shareholders, and at an extraordinary general meeting of both classes of shareholders a series of resolutions were carried altering certain of the Articles of Association with the same object in view.

International Light & Power Co., Ltd.—Mr. Follett Holt, presiding at a meeting of shareholders in London, said that there had been no break in the steady growth of the business of the Caracas undertaking since it was acquired. The number of connections to the electric supply mains was in excess of 7,000, which was a high figure for a South American city of the size of Caracas, and the maximum had not been reached. A dividend on account of accrued arrears equivalent to two quarters at the rate of 6 per cent. per annum had just been paid to the preference shareholders, and the board was considering how to deal with the remaining arrears. During the war they had passed through very difficult times, and he expressed their thanks to Messrs. J. G. White & Co., Ltd., who had looked after the technical management of their subsidiaries and controlled them with care and skill, bringing them through into comparative safety. The chairman asked shareholders to sign proxies for use at the annual meeting in Toronto on December 30th.

Western Telegraph Co., Ltd.—The report to June 30th, 1918, states that the revenue was £1,465,911, and the working expenses were £528,602. After providing £32,747 for debenture stock interest and £385,521 for income-tax and excess profits duty, £519,041 remains, plus £35,433 brought forward. £250,000 has been transferred to general reserve, £30,000 to land and buildings depreciation, £50,000 to maintenance ships reserve fund, £25,000 to provision on account of investment fluctuations. The total distribution for the year (dividend and bonus) is 8 per cent., free of tax, leaving £33,130 to carry forward. Sir J. Denison Pender has been elected chairman.

Bogota Telephone Co., Ltd.—The report to June 30th, 1918, states that the equipment at Bogota has been maintained in an efficient condition. The company has been fortunate in being able to proceed further with the installation of the additional plant, in spite of the difficulty in exportation. It is hoped that the new capital expenditure involved will enable the company to improve the system and meet the demands for service at an early date.

Monte Video Telephone Co., Ltd.—After providing for all charges, income-tax, and excess profits duty the net profit for the year ended July 31st, 1918, was £27,780, against £26,324. £6,332 was brought forward. After applying £8,000 to depreciation of property and plant, transferring £9,000 to reserve for renewals, and paying final dividends of 3 per cent. free of tax on the ordinary shares, making 6 per cent. for the year, £8,428 remains to be carried forward.

Callender's Share & Investment Trust, Ltd.—A financial paper announces a dividend of 3½ per cent. (8 2-5d. per share), less income-tax, for the half-year, making 6 per cent. for the year; £500 to reserve; £741 written off preliminary expenses and cost of debenture stock issue; £5,305 forward.

Siemens Bros. & Co., Ltd.—According to statements appearing in several London evening papers this company is about to make a public issue of capital consisting of 200,000 shares of £5 each, offered at par, and £500,000 debenture stock (4½ per cent.), at £87 10s.

British Electric Traction Co., Ltd.—Dividend on the 6 per cent. cumulative preference stock for the half-year ended September 30th.

Ruston & Hornsby, Ltd.—Interim dividend on the ordinary shares at the rate of 5 per cent. per annum for the half-year ended September 30th.

J. F. & G. Harris, Ltd.—Net profit for year ended June, 1918, £655, plus £124 brought forward. Income-tax and preference dividends £379; directors' fees £75; £325 carried forward.

Chloride Electrical Storage Co., Ltd.—Interim dividend of 5 per cent., free of tax, on the ordinary shares.

Power Gas Corporation, Ltd.—Dividend, 6 per cent., less income-tax.

Canadian Western Natural Gas, Light, Heat & Power Co.—Dividend 2 per cent. for the year ended September 30th.

STOCKS AND SHARES.

TUESDAY EVENING.

VARYING degrees of normality are noticeable in the Stock Exchange markets. The depression in prices that succeeded the first burst of enthusiasm on the armistice news has been followed in its turn by another upward movement, and by a return of better business. Profit-snatchers were soon cleared out of the way. Steady investment buyers have taken their place. Plenty of money is available for tempting securities, and knowledge of this is no doubt responsible for the rumours as to large numbers of new issues being ready for subcription as soon as the Treasury relaxes its regulations in regard to offers of shares.

The appeal by Sir Rider Haggard for some scheme whereby electricity could be brought to the door of every cottage in the Kingdom has left the Stock Exchange rather cold, for the reason that most of the many efforts made in this direction during the past five-and-twenty years have met with failure. The idea is no new one. Big financial interests have bent their energies and spent their money in trying to induce this same result. Every effort has been made to get large employers to take current, to persuade the cottager to use electricity. With slender avail, however. A few successes made the failures more emphatic. Maybe the war, jostling old ideas into limbo, will work the change which peace-time merely toyed with. Given a readiness to grasp at improvement, there will be an equal readiness—despite past disappointment—to provide the power. Apparently the Government is alive to the modern need, and when the immediate post-war problems are dealt with, a comprehensive national scheme may be introduced on lines already roughed out by the Parliamentary Commission.

Meanwhile, the share market continues quiet and firm. Bromptons continue to advance, and Chelseas have gained a further 5s. Edmundson's are good, with rises in the ordinary to 12s., preference to 3¼, and non-cumulative preference to 1¼. British Westinghouse preference have rallied to 2½. General Electric ordinary shed 5s., but Fraser & Chalmers spurted to 32s.

Home Railway stocks have shaken off their recent heaviness, and a feature is the sharp recovery in Metropolitans and Districts. The Underground Railways group is steady. A second report is published by the Select Committee on Transport, advocating, amongst other things, a unification of the railway industry under public or private control. As is well known, the Government have the power, through an ancient Act of Parliament, to take over the railways on the basis of 25 years' purchase calculated on the average dividend of the past three years. Nationalisation would probably vary such terms now. The Stock Exchange view is that nothing is likely to be done yet awhile, although it is recognised that the handing back of the railways to their proprietors is not the easy matter that may be assumed on the face of it.

The flourishing Adelaide Electric Supply has declared a final dividend of 7 per cent., free of tax, making 12 per cent. for the year, and the Melbourne Electric Supply, little less prosperous, announces a 6 per cent. tax-free final dividend, making 10 per cent. for the year. Canadian Electrical bonds are better, Kaministiqua fives at 87 and Electrical Development of Ontario fives at a point less. British Columbia issues show big rises. Brazilians are also good, Tractions recovering 1 and Rio Tramway Firsts hardening to 92, Sao Paulo Consolidated stock to 81.

Marconis have thrown off their recent depression, and the price of the parent shares recovered to 4⅞ before a slight reaction occurred. Americans picked up to 32s. 3d., and Marconi Marines to 3 11/16. Canadians continue quiescent about 14s. 3d. The cable list is uninteresting. The Oriental Telephone and Electric Co. has decided to return the useful sum of 26s. per share to its proprietors, "being part of the moneys resulting from the conversion into money and collection of certain capital assets." This is just about what the market anticipated that the bonus would be likely to come to. Great Northerns are £1 lower, and Eastern ordinary fell a point. Telegraph Constructions continue their rise, hardening to 48½.

Foreign descriptions are still popular. The strength of Brazilians has already been noticed. Mexico Tramways Common are up to 41; the bonds are also better. Telephone of Egypt 4½ per cent. debenture has gained 2 points at 72. Anglo-Argentine Tramways preference shares are both 1/16 harder. Other industrials keep firm. Rubber shares are gaining more support again. Armament and explosive issues, despite the armistice, are steadily mounting. But copper and other base-metal shares are dull throughout.

SHARE LIST OF ELECTRICAL COMPANIES.

	Dividend 1916.	Dividend 1917.	Price Nov. 26, 1918.	Rise or fall.	Yield p.c.
HOME ELECTRICITY COMPANIES.					
Brompton Ordinary	9	10	7½	+ ½	£7 0 6
Charing Cross Ordinary	5	4	3¾	—	5 14 4
do. do. do. 4½ Pref.	4½	4½	3¾	—	6 12 4
Chelsea	8	5	3¾	+ ½	6 9 0
City of London	8	8	12½	—	5 18 6
do. do. 6 per cent. Pref.	6	6	10½	—	5 18 5
County of London	7	7	11½	—	6 5 7
do. do. 6 per cent. Pref.	6	6	10½	—	5 18 5
Kensington Ordinary	6	7	8¾	—	6 7 2
London Electric	Nil	Nil	1½	—	Nil
do. do. 6 per cent. Pref.	4	5	4	—	6 5 0
Metropolitan	3	4	3½	—	6 3 1
do. 4½ per cent. Pref.	4½	4½	3½	—	6 18 6
St. James' and Pall Mall	8	9	7½	—	6 6 4
South London	5	5	3	—	6 13 4
South Metropolitan Pref.	7	7	20⅜	—	6 16 7
Westminster Ordinary	7	9	7½	—	6 6 4
TELEGRAPHS AND TELEPHONES.					
Anglo-Am. Tel. Pref.	6	6	99	—	6 1 0
do. Def.	1½	1½	23⅜	—	6 8 6
Chile Telephone	8	8	7½	—	5 6 8
Cuba Sub. Ord.	7	7	10½	—	*6 13 4
Eastern Extension	8	8	15½	—	*5 1 7
Eastern Tel. Ord.	8	8	160½	—1	*4 19 7
Globe Tel. and T. Ord.	7	7	14½	—	*4 16 5
do. do. Pref.	6	6	10½	—	5 14 3
Great Northern Tel.	24	22	33	—1	6 13 5
Indo-European	13	13	58½	—	5 11 0
Marconi	15	20	4⅞	+ ⅛	4 7 2
Oriental Telephone Ord.	10	10	24	—	2 17 2
United R. Plate Tel.	8	8	7½	+ ⅛	*5 4 0
West India and Panama	6d.	1/3	1 1/16xd	—	*3 12 6
Western Telegraph	8	8	10½	—	*4 15 7
HOME RAILS.					
Central London Ord. Assented	4	4	6⅝	—	6 2 3
Metropolitan	—	1	29⅞	+⅜	3 7 10
do. District	Nil	Nil	26	+1½	Nil
Underground Electric Ordinary	Nil	Nil	9¾	+ ⅛	Nil
do. do. "A"	Nil	Nil	9/-	—	Nil
do. do. Income	6	4	88½	—	*4 10 5
FOREIGN TRAMS, &c.					
Adelaide Sup. 6 per cent. Pref.	6	6	4⅞	—	6 6 4
Anglo-Arg. Trams. First Pref.	5½	5½	4	+ 1/16	—
do. do. 2nd Pref.	5⅜	—	3⅜	+ 1/16	—
do. do. 5 Deb.	5	5	77½	—	6 9 0
Brazil Tractions	—	—	58	+1	—
Bombay Electric Pref.	6	6	10⅞	—	5 11 7
British Columbia Elec. Ry. Pfce.	5	5	63xd	+2½	7 11 5
do. do. Preferred	Nil	Nil	52½	+4	Nil
do. do. Deferred	Nil	Nil	48½	+2	Nil
do. do. Deb.	4½	4½	63	+1	6 17 8
Mexico Trams 5 per cent. Bonds	Nil	Nil	67	—	Nil
do. 6 per cent. Bonds	Nil	Nil	85	+2	Nil
Mexican Light Common	Nil	Nil	40	—	Nil
do. Pref.	Nil	Nil	50	—	Nil
do. 1st Bonds	Nil	Nil	73	+1	—
MANUFACTURING COMPANIES.					
Babcock & Wilcox	15	15	30	—	4 2 4
British Aluminium Ord.	10	10	14	— 1/16	5 14 4
British Insulated Ord.	20	20	24	—	4 9 0
British Westinghouse Pref.	7½	7½	29	+ ⅛	5 9 1
Callenders	20	25	9½	— ¼	6 9 10
do. 5 Pref.	5	5	5¼	—	—
Castner-Kellner	22	20	80	—	5 10 4
Edison-Swan, "A"	—	—	—	—	Nil
do. do. 4 per cent. Deb.	4	4	75⅜	—	5 6 0
Electric Construction	7½	10	14⅜	—	7 12 6
Gen. Elec. Pref.	6	6	106	—	6 2 4
do. Ord.	10	10	17⅜	— ½	*5 12 8
Henley	28	25	28	—	5 11 2
do. 4½ Pref.	4½	4½	4	—	5 12 6
India-Rubber	10	10	17½	—	*5 14 8
Telegraph Con.	30	30	48½	+ ½	*4 19 0

*Dividends paid free of Income Tax.

AMERICAN EXPORTS OF ELECTRICAL GOODS.

The following figures, showing the exports of electrical goods from the United States during the year ended June, 1917, are taken from the recently-issued trade statistics; figures for 1915-16 have been added for purposes of comparison, and notes of any increases or decreases given :—

	Dollars. 1915-16.	Dollars. 1916-17.		Dollars. Inc. or dec.
Telegraph instruments.—				
To Denmark	17,000	17,000		—
„ Canada	26,000	50,000	+	24,000
„ Central America	8,000	11,000	+	3,000
„ Mexico	41,000	14,000	−	27,000
„ Colombia	1,000	12,000	+	11,000
„ Argentina	2,000	5,000	+	3,000
„ Cuba	2,000	15,000	+	13,000
„ Brazil	1,000	9,000	+	8,000
„ Great Britain	23,000	94,000	+	71,000
„ Other countries	28,000	312,000*	+	284,000
Total	149,000	539,000	+	390,000

* Italy $141,000, China $15,000, Japan $26,000.

Telephone instruments.—				
To United Kingdom	582,000	51,000	−	531,000
„ Canada	161,000	213,000	+	52,000
„ Central America	20,000	13,000	−	7,000
„ Mexico	20,000	19,000	−	1,000
„ Cuba	80,000	190,000	+	110,000
„ Brazil	48,000	232,000	+	184,000
„ Colombia	11,000	20,000	+	9,000
„ Ecuador	11,000	21,000	+	10,000
„ Japan	74,000	148,000	+	74,000
„ Australia	62,000	56,000	−	6,000
„ Italy	137,000	230,000	+	93,000
„ Other countries	123,000	761,000*	+	638,000
Total	1,329,000	1,954,000	+	625,000

* Russia $246,000, China $117,000.

Other electrical instruments and appliances.—				
To Canada	2,693,000	5,298,000	+	2,605,000
„ Mexico	314,000	400,000	+	86,000
„ Panama	212,000	299,000	+	87,000
„ Cuba	558,000	981,000	+	423,000
„ Argentina	412,000	760,000	+	348,000
„ Brazil	497,000	715,000	+	218,000
„ Japan	411,000	1,019,000	+	608,000
„ Philippine Islands	177,000	146,000	−	31,000
„ Australia	520,000	821,000	+	301,000
„ United Kingdom	3,490,000	4,620,000	+	1,130,000
„ France	592,000	1,583,000	+	991,000
„ Italy	910,000	2,186,000	+	1,276,000
„ Norway	678,000	824,000	+	146,000
„ Russia	452,000	1,210,000	+	758,000
„ Other countries	2,057,000	3,675,000*	+	1,618,000
Total	13,973,000	24,537,000	+	10,564,000

* Chile $625,000, China $281,000.

Gas engines, stationary.—				
To Canada	58,000	63,000	+	5,000
„ Argentina	4,000	5,000	+	1,000
„ Australia	32,000	66,000	+	34,000
„ Europe	146,000	335,000	+	189,000
„ Other countries	112,000	249,000*	+	137,000
Total	352,000	718,000	+	366,000

* Japan $23,000.

Electric motors.—				
To France	334,000	387,000	+	53,000
„ United Kingdom	380,000	555,000	+	175,000
„ Canada	638,000	1,286,000	+	648,000
„ Panama	102,000	33,000	−	69,000
„ Mexico	49,000	107,000	+	58,000
„ Cuba	140,000	289,000	+	149,000
„ Argentina	54,000	104,000	+	50,000
„ Brazil	52,000	126,000	+	74,000
„ Chile	91,000	310,000	+	219,000
„ British India	69,000	114,000	+	45,000
„ Japan	139,000	195,000	+	56,000
„ Australia	686,000	720,000	+	34,000
„ South Africa	154,000	204,000	+	50,000
„ Russia-in-Europe	614,000	261,000	−	353,000
„ Italy	147,000	216,000	+	69,000
„ Spain	90,000	205,000	+	115,000
„ Other countries	480,000	778,000*	+	298,000
Total	4,219,000	5,890,000	+	1,671,000

* China $126,000.

Steam engines, stationary.—				
„ Canada	142,000	195,000	+	53,000
„ Cuba	133,000	195,000	+	62,000
„ Mexico	17,000	23,000	+	6,000
„ Brazil	2,000	21,000	+	19,000
„ Philippine Islands	12,000	6,000	−	6,000
„ Other countries	106,000*	485,000†	+	379,000
Total	412,000	925,000	+	513,000

* Venezuela $18,000.
† Russia $310,000, Chile $13,000, Australia $11,000.

	Dollars. 1915-16.	Dollars. 1916-17.		Dollars. Inc. or dec.
Electric locomotives.—				
To United Kingdom	—	15,000	+	15,000
„ Canada	72,000	208,000	+	136,000
„ Argentina	—	61,000	+	61,000
„ Mexico	3,000	11,000	+	8,000
„ Bolivia	—	2,000	+	2,000
„ Chile	19,000	182,000	+	163,000
„ China	33,000	—	−	33,000
„ Brazil	12,000	—	−	12,000
„ Russia-in-Europe	146,000	—	−	146,000
„ Bermuda	96,000	—	−	96,000
„ Other countries	71,000	84,000*	+	13,000
Total	452,000	563,000	+	111,000

* France $49,000.

Dynamos and generators.—				
To Canada	330,000	426,000	+	96,000
„ United Kingdom	204,000	63,000	−	141,000
„ Panama	17,000	5,000	−	12,000
„ Mexico	9,000	51,000	+	42,000
„ Cuba	141,000	229,000	+	88,000
„ Brazil	4,000	29,000	+	25,000
„ Peru	8,000	53,000	+	45,000
„ Japan	88,000	245,000	+	157,000
„ Australia	24,000	88,000	+	64,000
„ Spain	34,000	107,000	+	73,000
„ France	142,000	160,000	+	18,000
„ Italy	67,000	291,000	+	224,000
„ Other countries	401,000	808,000*	+	407,000
Total	1,469,000	2,555,000	+	1,086,000

* China $222,000.

Fans.—				
To Canada	23,000	97,000	+	74,000
„ Argentina	63,000	30,000	−	33,000
„ Brazil	7,000	6,000	−	1,000
„ China	18,000	33,000	+	15,000
„ British India	92,000	164,000	+	72,000
„ Japan	11,000	8,000	−	3,000
„ Australia	21,000	16,000	−	5,000
„ United Kingdom	20,000	21,000	+	1,000
„ Other countries	102,000	108,000*	+	6,000
Total	357,000	483,000	+	126,000

* Mexico $17,000.

Arc lamps.—				
To Canada	8,000	4,000	−	4,000
„ Brazil	2,000	1,000	−	1,000
„ Other countries	9,000	11,000	+	2,000
Total	19,000	16,000	−	3,000

Metal-filament lamps.—				
To Russia-in-Europe	115,000	6,000	−	109,000
„ Russia-in-Asia	9,000	3,000	−	6,000
„ United Kingdom	87,000	15,000	−	72,000
„ Canada	135,000	461,000	+	326,000
„ Mexico	86,000	168,000	+	82,000
„ Cuba	172,000	273,000	+	101,000
„ Argentina	82,000	216,000	+	134,000
„ Brazil	101,000	265,000	+	164,000
„ Australia	92,000	83,000	−	9,000
„ China	67,000	90,000	+	23,000
„ Other countries	336,000†	564,000*	+	228,000
Total	1,282,000	2,144,000	+	962,000

* Italy $31,000, Chile $93,000, Uruguay $54,000.
† South Africa $57,000, India $21,000.

Carbon-filament lamps.—				
To Argentina	11,000	7,000	−	4,000
„ Canada	18,000	87,000	+	69,000
„ Mexico	14,000	17,000	+	3,000
„ Brazil	7,000	5,000	−	2,000
„ Peru	7,000	8,000	+	1,000
„ Other countries	88,000*	33,000	−	55,000
Total	145,000	157,000	+	12,000

* Russia-in-Europe $18,000, Australia $6,000.

Stgtic transformers.—				
To United Kingdom	44,000	13,000	−	31,000
„ Spain	133,000	39,000	−	94,000
„ Canada	132,000	220,000	+	88,000
„ Panama	50,000	15,000	−	35,000
„ Mexico	17,000	51,000	+	34,000
„ Cuba	32,000	103,000	+	71,000
„ Brazil	94,000	132,000	+	38,000
„ Chile	17,000	119,000	+	102,000
„ Japan	4,000	11,000	+	7,000
„ Australia	70,000	44,000	−	26,000
„ Italy	84,000	46,000	−	38,000
„ South Africa	60,000	41,000	−	19,000
„ Other countries	256,000	431,000*	+	175,000
Total	993,000	1,265,000	+	272,000

* Russia $136,000, China $57,000.

Insulated wire and cables.—	Dollars. 1915-16.	Dollars. 1916-17.	Dollars. Inc. or dec.
To France	150,000	1,965,000	+ 1,815,000
,, Norway	318,000	463,000	+ 145,000
,, United Kingdom ...	663,000	759,000	+ 96,000
,, Spain	87,000	234,000	+ 147,000
,, Canada	148,000	180,000	+ 32,000
,, Panama	236,000	225,000	− 11,000
,, Mexico	58,000	189,000	+ 131,000
,, Cuba	281,000	495,000	+ 214,000
,, Brazil	286,000	571,000	+ 285,000
,, Australia	66,000	73,000	+ 7,000
,, Other countries ...	864,000	2,038,000	+ 1,174,000
Total	3,157,000	7,192,000	+ 4,035,000

PATENT LAW AMENDMENT.

(*Concluded from page* 487.)

Articles for Food or Medical Purposes.—Clause 11 (section 38a). This clause makes it impossible to patent articles intended for food or medicinal or surgical purposes or capable of being used for the production of food or medicine or surgical appliances.

The processes of making foods, drugs, and medicines can, however, be patented. To illustrate the drastic effect of such provisions it is only necessary to mention the following examples of a few of the articles which would be unpatentable under the section:—

1. All new machinery capable of being used in bakeries or for food production.
2. Surgical instruments and appliances of all kinds.
3. Electric motors capable of being used for driving dentists' drills, &c.
4. X-ray tubes and other X-ray apparatus.
5. Machines and apparatus useful in the manufacture of drugs and medicines.

The provisions of the section will prevent inventors and capitalists from developing industries which are admittedly in great need of stimulation and encouragement. It will tend to prevent many new developments which otherwise would surely take place after the war. It must not be forgotten that it is very difficult to induce manufacturers to take up unpatented inventions. This country is notoriously behindhand not only with inventions relating to drugs and the like, and surgical and therapeutic appliances, but also in their development and manufacture. Practically all the supplies of modern articles used in surgery and other curative treatment, for example, electrotherapeutic apparatus, dental material, and surgical appliances of all kinds, have been imported from America and Germany, where considerable industries exist in this class of apparatus.

There is no reason why this industrial development and manufacture should not be carried on in this country. Our position in medical and surgical science justifies all the industrial support that can be given to it.

The framers of the section in considering its effect from a humanitarian point of view, appear to have overlooked the fact that the encouragement of invention greatly helps progress.

The committee considers that the section should be eliminated from the Bill, and suggests that the real objects of the section so far as it relates to drugs and medicines will be more readily accomplished by altering the present Acts relating to foods and drugs.

Approval of Clauses 5, 8, 9, *and* 15.—The committee considers that these clauses of the Bill embody improvements—clause 8 being the most important.

Clause 5 provides that when: (*a*) an applicant has agreed in writing to assign a patent when granted to another party or joint applicant and refuses to proceed with the application; or (*b*) disputes arise between joint applicants as to proceeding with an application, the Comptroller under certain conditions may grant a patent to the other party or to one of the joint applicants.

Clause 8 provides that in any action for infringement, a patent, otherwise bad, shall not be invalidated if it contains one good claim. At present a patent otherwise good is invalidated if it contains one bad claim.

Clause 9. "In an action for infringement, the plaintiff shall be entitled to relief by way of injunction and damages, but not to an account of profits."

Clause 15. An assignment of or a licence to use a patent shall not be admitted in evidence in any Court unless it has been recorded on the Patent Office Register.

Term of Patents.—Clause 6 increases the term, which is now 14 years, to 15 years, with a proviso that it may be extended to 16 years if it is found expedient to secure greater uniformity with countries which may be parties to any international convention.

While the committee would prefer that the term be 17 years, as in the U.S.A., it recommends that at least the term should definitely be made 16 years, as there would clearly be no objection in principle to that.

Suggested Extension of Provisional Term.—The committee regrets that the period within which a complete specification may be left, after an application accompanied by a provisional specification has been filed, has not been extended. Section 5 of the Act of 1907 reduced this period from nine months to six months, it is understood because the period of three months then remaining before the acceptance of the complete specification must take place was too short to enable the Patent Office to make its search as to the novelty of the invention and for the specification and claims, if necessary, to be amended.

With many inventions, especially those relating to complicated machines and apparatus, the present period of six months' provisional protection is entirely inadequate to allow of an experimental machine or apparatus being made or tested. This is not to the benefit of the patentee, who should have sufficient time to test his invention and to prepare a complete specification and claims which will adequately protect that invention. And it is not to the benefit of the public, because they are thereby debarred from obtaining from the inventor such a full disclosure of the invention as will enable them to work it after the expiry of the patent to the best advantage. The committee strongly urges that there should be a reversion to the old period of nine months, with the possibility of obtaining at least three months' extension of this term on payment of a nominal fee, instead of one month only as at present. Thus the maximum period would be twelve months instead of seven months from the filing of the provisional to the filing of the complete specification.

In the United States the law gives the inventor what amounts to provisional protection for two years. This arises from the fact that the invention may have been in public use, or on sale, in the United States for two years prior to the date of application for the patent without in any way affecting its validity.

Extension of Term for Acceptance.—The committee also strongly urges that the time within which, after filing the complete specification, the same may be accepted, should be extended. Such an extension will be necessary if the provisional term is extended to nine months as suggested above. Under the present Act (section 6) (5) the complete specification must be accepted within twelve months of the date of application, with a possible extension of not more than three months on payment of fees amounting in all to £6, or actually more than the fees payable on application for and sealing of the patent.

One reason for closely limiting the time within which complete specifications must be accepted has now disappeared. Previously, delay in the acceptance of a complete specification delayed the appearance of the illustrated abridgments of specifications, but this is no longer the case, as under the new system now in force each specification is given a fresh consecutive number on acceptance, which ultimately becomes the patent number.

At present it sometimes happens that the examiner's search for novelty is not communicated to the applicant until three or possibly four months after the date of filing the complete specification.

If the complete specification is filed six months after filing the provisional specification, this leaves only two months within which the result of the search can be communicated to the applicant. If he resides abroad, or is temporarily absent from this country, this period of two months is usually insufficient—and for the more distant colonies quite insufficient for him to study the whole matter and consider what amendment of his specification or claims may be necessary, and generally complete the prosecution of his application.

The committee strongly recommends that the time within which the complete specification must be accepted should be extended as a minimum to eighteen months after the date of application, with the possibility of extending this term as at present by three months on payment of a fee which the committee thinks should be much less than at present.

The restrictive procedure here as regards extensions compares very unfavourably with that in other industrial countries. Thus the period allowed in the United States is one year for filing an amendment to each official action of the Patent Office examiner. On allowance of an application, even though it has taken several years to go through the Patent Office, there is a further period of six months within which to pay the final fee (corresponding to the sealing fee here) and secure the issue of the patent.

In Germany, on allowance of an application, even though it has taken two or three years to go through the office, the applicant may demand three months' delay of publication, and this cannot be refused, and he may obtain a further three months' delay, all without payment.

These periods are very valuable because, having secured allowance of his application either in Germany or the United States, an inventor then has time to file applications for patents in such other countries as he desires without having such patents invalidated by the publication of the German or United States specification. In this country, contrary to what is the case in the United States and Germany, the applicant has only a partial search to guide him as to the novelty of his invention, and after securing the acceptance of his application at high pressure, the utmost delay he can

obtain within which to make a decision and file foreign patents before the British specification is published is three months, for which he must pay £6, assuming, of course, that it has not been necessary for him already to secure this extension of three months within which to meet the examiner's objections and secure the acceptance of his specification.

The view is held in some quarters that acceptance of a complete specification should take place at an early date in order that manufacturers here should be in a position to ascertain without undue delay what patents have been applied for so that they may not suddenly find themselves confronted with a patent covering a process which they have adopted, or an article upon the manufacture of which they have embarked. The committee does not believe that the danger in question exists to any extent, but it could be guarded against by arranging that if not accepted after the expiration of twelve months—or 15 months if the provisional term be restored to nine months as suggested—the complete specification should be open to public inspection *in the condition in which it was originally filed.* This procedure is already adopted in connection with applications for patents filed under the International Patents Convention. (See section 91 (3) (a) of the Act.)

The applicant is not likely to cause unnecessary delay, since under section 10 of the Act he does not enjoy the rights of a patentee until his complete specification is accepted.

Patent to Bind the Crown (section 29 of the Act).—The committee regrets that no substantial alteration is made in this section by the proposed Bill.

Notwithstanding the provision of the section that a patent shall have the like effect against His Majesty the King as it has against a subject, experience has shown that the administration of the proviso of the section has in effect practically nullified the operation of a patent against Government departments.

Great dissatisfaction has for many years been expressed in connection with the operation of the section, and the committee feels that inventors have been greatly discouraged in their endeavours to produce inventions of national importance.

It has been found practically impossible for patentees to obtain compensation for the use by or on behalf of Government departments of their patented inventions. In many cases patentees have been asked to supply and have supplied working drawings, only to find that the latter have been distributed freely to their competitors, who have obtained most, if not all, of the Government orders for the patented article. The patentee has had no effective remedy, and frequently, after voluminous and prolonged correspondence with the department in question, has had to abandon all hope of obtaining any compensation.

There is no method under the present legislation whereby the patentee can compel the determination of the matters in dispute between himself and a Government department with regard to his patent. Inventors and patentees object to the Treasury being practically in the position of purchaser, having the right to dictate the amount which shall be paid for the use of inventions. The committee strongly recommends that the terms upon which an invention may be used by the Crown shall in default of agreement be decided by the High Court, and that the patentees should be entitled to apply to the Court for this purpose. On the hearing of such applications the Crown and the Treasury can be represented, and the interests of all parties would be properly safeguarded—with due regard to national requirements, for example, as regards secrecy and otherwise.

The committee believes that the adoption of the above procedure would greatly stimulate the development of inventions of national importance.

Cancellation of Registration of Designs.—The committee points out that the amendment proposed in clause 14 of the Bill will necessitate section 56 of the Act itself being amended. Clause 14 proposes that *at any time* after the registration of a design a petition may be presented to the Comptroller for cancellation of the registration. Section 56 of the Act, however, provides that registered designs shall not be open to inspection for a period of at least two years after the date of registration except by certain privileged persons, and then only in the presence of an officer and on payment of a fee, and no copy of the design may be taken by the person making the inspection. These restrictions would very largely nullify the usefulness of the amendment proposed in section 14.

Patents of Addition.—The committee is of opinion that the proviso proposed to be added to section 19 (3) of the Act should be as follows:—"Provided that if the patent for the original invention is revoked or lapses for any reason, then the patent of addition shall, if the patentee so applies in writing to the Comptroller, become an independent patent, &c." (to end of proviso).

The committee feels that this alteration is more fair to patentees than that the matter should be in the discretion of the Comptroller or the Court as proposed in the Bill.

Patents Fees and Profits of Patent Office.—The Bill makes no change in the present official fees. The 1907 Act, by section 65 and schedule 1, allows maximum official fees of £155 on a full-term patent, but provides that lower fees may be prescribed by the Board of Trade with the approval of the Treasury.

At present the prescribed fees on a full-term patent are:—

	£	£
On filing provisional specification	1	
On filing complete specification	3—	4
Or, on filing a complete specification		4
On sealing of patent		1
Total (four years' life)		5
Annual Renewal Fees begin with £5 at the end of the fourth year, and rise £1 a year to £14 at the end of the fourteenth year. Total renewal fees		95
Total fees for full-term patent		100

In the opinion of the committee these fees are much too high, and compare unfavourably with those in many other industrial countries. Low patent fees would lead to a great development in invention, and the country would benefit thereby.

It is probable that the favourable position occupied by the United States as regards inventions is largely due to the fact that patenting is cheap in that country—where patents are granted for their full term of 17 years at a cost in official fees of only £7 ($35). There are about 70,000 patent application per annum in the United States, as compared with about 27,000 here. And it is to be noted that in spite of the smallness of the fees the U.S. Patent Office is not only self-supporting, but yields an average surplus of more than £40,000 per annum. Although the committee prefers the British system of a short-term patent renewable after four years by the payment of annual fees, and considers the present fees of £5 to cover the first four years of the life of a patent reasonable, it feels very strongly that the renewal fees are much too high.

It is submitted that the present system by which large profits are made out of patent fees is wrong—that patents should be granted at the lowest possible cost consistent with the Patent Office being self-supporting—that the State should tax patents only through the income tax of patentees, thus taxing only successful inventors, and that the encouragement of invention by lowering the cost of patents would almost certainly lead to a far greater return in income tax than the loss of revenue consequent on lower official fees.

It is thought probable that even in the very unlikely event of the number of patents not being increased, the reduction of renewal fees would very soon produce as much as at present, by reason of the increase in the number of patents that would be kept up.

At present the mortality of patents is very great. Less than 40 per cent. survive the fifth year, and less than 20 per cent. the seventh.

Patent Office Finances.—The average results of working the Patent Office for the ten years 1907-16 may be summarised as follows:—

	£
Receipts.—Patent fees on application, including sealing	92,574
Patent fees, renewal fees	172,896
Total ...	265,470
Receipts from all other sources	45,741
Total ...	311,211
Expenditure	194,867
Annual Surplus	116,344

Attention is drawn to the very large proportion of the total receipts represented by patent fees, and to the very large proportion of the latter that is made up of renewal fees. It will be understood that almost all the expenditure of the Patent Office on patents is incurred at the early stages of a patent, and practically none on the granting of renewals.

Suggested Reduction of Renewal Fees.—The committee recommends that in view of the large average surplus of £116,344, the cost of patents should be very substantially reduced. This recommendation is in accord with the principle set forth in Parliament by the Chancellor of the Exchequer, Sir Michael Hicks Beach, in 1890—that while patentees should bear the cost of the Patent Office, he did not think the country ought to look to the Patent system as a permanent source of income.

A reduction of the renewal fees by one-half is strongly recommended. This would make the cost of a full-term patent:—

	£	s.	d.
To grant and sealing (as at present)	5	0	0
Renewal fees	47	10	0
	52	10	0

Even in the very improbable event of no increase taking place in the number of patents applied for, completed, and kept up, such a reduction—on the basis of the average of the ten years 1907-16—would still leave a surplus of £29,896.

Should the effect of the reduction now recommended be to produce a considerable surplus, it is suggested that such surplus should be used for a further reduction of the renewal fees.

In support of this recommendation by the committee of a reduction of renewal fees by one-half, attention is drawn to the fact that clause 2 of the Bill provides that patents endorsed "licences of right" shall be subject to such a reduction.

Proposed New Tribunal.—The committee states its views upon a matter which, although it does not relate directly to the proposed Patent Bill, has a very important bearing upon it, namely, the legal procedure by which all disputes involving scientific questions are determined. Recommendations on this matter have already been made by the Federation of British Industries, an association which, it is understood, represents capital of some £2,500,000,000 sterling.

The committee feels that it is due to the industries of the country that there should exist in the High Court of Justice a division specially constituted to deal with litigation involving scientific and technical questions. During recent years the application of science to industry has become so increasingly complex that such a division is more than ever essential.

Although the great ability of the judges of the Chancery Division, and their willingness to try scientific cases are admitted, yet the views of the judges as to what is invention have varied to a degree which has made it nearly, if not quite, impossible for manufacturers to obtain definite opinions as to the chances of success in patent disputes. The much larger field which embraces questions of industrial contracts is also in a very unsatisfactory state. There is, in the opinion of both parties to such contracts, no satisfactory tribunal to decide such matters.

If industry is to flourish to the fullest extent there must exist machinery for adjudicating effectively upon actions involving technical matters, and the Committee urges in the strongest manner possible that such machinery should be provided. It is probable that more money and more serious issues are involved in patent and other technical questions than in all other actions put together.

It is in the opinion of the committee obvious that no adequate experience can be gained or proper consideration given by a tribunal which does not give its whole attention to technical disputes.

Any alterations in the law relating to patents, trade marks, or designs should be made coincidentally with the constitution of such a division.

NOTES FROM CANADA.

(From our Special Correspondent.)

Several times, before war broke out, the question of the Hydroelectric Power Commission of Ontario building and operating a system of municipally-owned telephones was mentioned; according to the daily Press, the matter is to come up again, as it is announced that there will be called soon a meeting of the executive of the Ontario Municipal Electrical Association, which represents 190 municipalities, to discuss the proposal. The Mayor of Toronto is quoted as saying that it would put a telephone in every working man's house in the city at half the present cost.

There is no doubt that if the cost is reduced to half of what it is at the present there would not be many houses in the province without the convenience of a telephone, as they are very much more common here, even under present conditions, than they are in England.

It is curious, however, to note that, since the Mayor referred to made his statement about halving the present cost of telephones, the Bell Telephone Co., of Canada, has announced its intention of increasing the rate charged for telephones by 20 per cent. on the plea that increased costs justify it—this is being rigorously opposed in some parts of Canada.

The power shortage in Ontario is so serious owing to munitions works requirements that there is talk of the necessity of rationing power—this is in spite of the fact that of more than 200,000 h.p. being furnished by the Hydroelectric Power Commission of Ontario fully 75 per cent. is being used for the manufacture of munitions. This same Commission recently notified the city of Campbellford that it intended to develop power at Ranney's Falls, close to that place, to produce 8,000 to 10,000 h.p., and to cost $1,250,000.

The Provincial Government of Quebec is carrying out a great water-power development on the St. Maurice River in the building of the so-called "La Loutre" dam; by means of this dam the waters of the St. Maurice will be stored up, and the low-water flow will be doubled. The dam is now nearing completion, the cost is about $1,500,000.

Upon its completion, a reservoir of 160,000 million cu. ft. will be created. From some 17 existing water-power sites about 350,000 h.p. can be obtained, but the dam will enable about 900,000 h.p. to be obtained, and from three existing power sites on the St. Maurice River yielding 190,000 theoretical h.p., it is expected that over 400,000 h.p. can be obtained.

Reference was made in these notes recently to the application of the St. Lawrence River Power Co. to the International Joint Waterways Commission for permission to build a submerged weir in the south channel of the St. Lawrence River near Long Sault Island, to enable it to get rid of ice troubles in the winter. Although the Canadian Government officially objected to the granting of the application, yet the permission was accorded, chiefly because in Washington the weir was considered to be an urgent war requirement. It is believed, however, that the matter is to come before the Commission again in five years' time.

The decision made in the above case seems to have emboldened another company—the New York & Ontario Power Co.—to ask of the same Commission approval of plans to construct a dam across the Little River on the south branch of the St. Lawrence at Ogden Island; the Dominion Government is opposing this application also.

The Board of Trade of the town of Estevan, Saskatchewan, is trying to secure co-operation amongst several towns to further a scheme for a municipal power scheme, the intention being to generate either electricity or gas from the great deposits of lignite near Estevan to supply Moose Jaw, Regina, and other places.

The development of 40,000 h.p. on the Rivière des Prairies, Island of Montreal, P.Q., is contemplated, as a company is seeking permission from the Quebec Government to go ahead with the scheme, $12,000,000 is named as the estimated cost.

Electricians in Toronto, in order that a high standard of proficiency may be maintained, are said to favour the appointment, by the Government, of a special licensing board to consist of five members, two from the Electrical Workers' Union, two from the Electrical Contractors' Association, and one from the Hydroelectric Power Commission.

NATIONAL ELECTRIC POWER SUPPLY.

A statement drawn up on behalf of local authorities in the North-East Coast area who are electricity undertakers has been presented to the Government departments concerned, with regard to the interim report made to the Reconstruction Committee by the Coal Conservation Sub-committee on Electric Power Supply in Great Britain, and the report made by the Electric Power Supply Committee appointed by the Board of Trade. The municipalities which have adopted the statement are those of Berwick-upon-Tweed, Middlesbrough, Newcastle-upon-Tyne, South Shields, Stockton-on-Tees, Tynemouth, and West Hartlepool. The following is an abstract of the document.

The municipalities concede that the unification of the production and distribution of electrical energy is desirable, provided that the best use is made of existing systems, that the generation and distribution of electrical energy is under local public control, and that proper safeguards are adopted in the interests of existing undertakers and consumers, and in particular that those municipal undertakings which can, in the opinion of the Electricity Commissioners, be economically worked without interfering with the efficiency of any general scheme, should continue to be owned and operated by their present owners. Limitations of areas of supply have in the N.E. Coast area operated to restrict expansion and to limit economy of production in regard to municipal electrical undertakings, to an extent markedly greater than has been the case with respect to private supply companies, and in so far as the reports affirm the desirability of widely extended areas of supply, the municipalities are in agreement with the recommendations.

With respect, however, to the Coal Conservation Sub-committee's report, the municipalities cannot ignore the fact that a report purporting to deal with problems of national economy in coal consumption has been utilised as a vehicle of attack upon the policy of municipal control of electricity undertakings, and of promulgating proposals which, if carried into effect, may be expected to consolidate the position of the Newcastle-upon-Tyne Electric Supply Co. and its allied and subsidiary companies, and to involve the subordination of municipal electrical undertakings to the dominance and control of the North-East Coast group of power companies.

The report of the Coal Conservation Sub-Committee is accepted by, and has clearly influenced, the Electric Power Supply Committee in arriving at its conclusions. The report cannot, however, be regarded as presenting any elements of finality, nor as offering other than the expression of the individual opinions of its framers. Its conclusions are supported mainly (*i*) by an estimated coal saving of 55 million tons per annum, and (*ii*) by a comparison between the average charge for electricity in the North-East Coast area and the charges of a number of municipalities in the southern parts of Lancashire.

The municipalities challenge the statement that a coal saving such as is estimated will be effected, even supposing the proposals of the reports be put into operation forthwith.

The adverse comparison between the alleged "average charge of less than ½d. per unit" of the North-East Coast supply companies and the charges of the Lancashire municipalities, is misleading and mischievous. No details are given

showing how this charge is arrived at, and the municipalities deny that it is a true representation of the facts, asserting that where all material factors are taken into consideration, the charges of the North-East Coast supply companies will be found to approximate very closely to those of comparable municipal undertakings.

Even should the allegation of an *average* charge of less than ½d. per unit be justified, the comparison is none the less misleading and fallacious, because the statement in table V. of the report, purporting to give the average prices charged for power by the Lancashire municipalities, gives prices which include the cost of distribution and other incidental expenses, and relate very largely to low-tension units supplied to consumers on their own premises, whereas a large proportion of the units supplied by the North-East Coast supply companies, the prices charged for which are apparently taken into account in arriving at the average charge of less than ½d. per unit, are high-tension units supplied in bulk to the distributors and users of electrical energy who, generally speaking, have to add the cost of transformation, and in some cases that of distribution, together with their profit, in the price actually charged to the ultimate consumer.

As regards the proposals of the reports respecting the constitution and powers of the proposed Board of Electricity Commissioners, the municipalities recognise the desirability of the establishment of some central and impartial authority charged with the duty of fostering electrical enterprise and encouraging the use of electricity as a source of motive power in industrial concerns. The municipalities, however, view with grave concern as a dangerous extension of the policy of bureaucratic control which has been increasingly prevalent during the war, the proposal to confer powers which for all practical purposes will determine the development of electrical enterprise throughout the country upon a small body of permanent officials, who will be supreme over all existing and future electricity undertakings, appointed by the President of the Board of Trade without reference to any superior authority, three of whom will hold office subject only to an age limit, and two of whom will be appointed for a short term of years. A small body of technical experts, however eminent individually, is in the view of the municipalities unfitted to be entrusted with autocratic powers of the character proposed; the central electrical authority should be so constituted as to be directly susceptible to the influence of public opinion and should comprise a sufficiency of members of independent judgment and general experience. It is essential that any such central electrical authority should be free from partisan bias.

The first Board of Electricity Commissioners should either be appointed directly by Parliament, or be constituted in accordance with directions given by Parliament so as to secure an impartial and judicial body, and the appointment of its constituent members should not be left to the absolute discretion of the President of the Board of Trade.

With respect to the delimitation of electrical districts and the constitution of District Boards, these questions should be disposed of by direct Parliamentary action after preliminary local inquiries. In no case should the decision on matters of this character be left in the disposition of a small body of experts.

It is unreasonable that any embargo should be placed upon extensions of existing electrical undertakings during any interval which may occur before the suggested super-power stations are in a position to supply power, especially as, instead of the "temporary lull in manufacturing output immediately after the war" contemplated by the Coal Conservation Sub-committee's report, the commercial necessities of the situation may then, on the contrary, as is apparently recognised by the Electric Power Supply Committee, more probably demand an immediate increase in the supply of electric power, which, the municipalities submit, can be effected quickly and economically by enlargements and extensions of the plant of existing undertakings.

The municipalities have already commented upon the pronounced anti-municipal bias of the Coal Conservation Sub-committee's report. This bias, while not so directly expressed in the report of the Electric Power Supply Committee, is none the less present therein, and the municipalities fear that if its proposals are put into effect the result in the North-East Coast area will be that the generation and supply in bulk of electricity may well pass from the municipalities, and that the North-East Coast group of companies will be left to continue their operations either on their own account or as lessees from the District Board.

The municipalities further direct attention to the inequitable character, so far as regards municipal electrical enterprises, of the financial proposals of the report. The basis of compensation proposed by the report will act unfairly as between municipalities and companies, and will have the effect of penalising those undertakers who have set up adequate reserve funds and maintained their undertakings in an efficient manner, and of favouring those undertakings which have distributed an undue proportion of their surplus revenues amongst shareholders, or in reduction of rates. If Electricity Boards are to be constituted to take over existing electrical undertakings the terms of transfer of municipally and commercially-owned generating stations and distributing systems should proceed upon the same basis, so that in the case of the former the capital of the undertaking should accrue to the municipality which has borne the risk and responsibility of the undertaking in the past.

Again, the municipalities object to the recommendation of the Electric Power Supply Committee's report that whereas commercial distributors of electricity are to continue to exercise the right of paying dividends to their shareholders, subject only to the limitations of a sliding scale of charges to consumers, municipalities which continue to distribute electricity are to be permitted either to make no profit at all or only a nominal profit.

Furthermore, the municipalities take strong exception to the proposal that District Electricity Boards or their lessees should be empowered to supply high-tension electricity in the areas of municipal distributors of electricity, and it is contended that, with the possible exception of electricity used by railway companies for traction purposes, there should be for each local area of supply a single distributor of electricity regardless of the question whether the energy supplied is low-tension or high-tension electricity.

Finally, it is manifestly inequitable that power supply companies (whose areas of supply for power happen to be reduced by the District Electricity Board, to cut out districts which can be better served from other districts) should, to the exclusion of municipalities (which may apparently be subjected to similar reduction of their areas of supply), have conferred upon them, as is proposed by the Electric Power Supply Committee's report, the right of supplying electricity for lighting purposes in places where there is at the time no lighting supply.

The municipalities do not concur in the proposals of the Electric Power Supply Committee's report that a preferential basis of rating should be accorded to electricity transmission mains, and that the existing restrictions as to the use of overhead lines should be removed.

The municipalities observe with satisfaction that the Electric Power Supply Committee's report recommends that in the national interest generating stations and main transmission lines ought, as a general rule, to be publicly owned, and they submit that the District Electricity Boards should, in all cases, be so constituted as to be wholly independent of the influence or control of commercially-owned electrical enterprises. To secure this object, it is strongly urged that the District Electricity Boards should consist of representatives of local authorities and large consumers to the exclusion of companies generating electricity.

In conclusion, the municipalities view with the gravest misgivings the manifest dangers presented by the recommendations of the reports of the establishment in the North-East Coast area of an electrical "trust" exercising with Parliamentary sanction paramount powers in that area with respect to the production and supply in bulk of electricity. They therefore most earnestly request that before any proposals are submitted to Parliament, based upon the reports, His Majesty's Government will institute a complete and exhaustive inquiry, and that no affirmative action be taken until an adequate opportunity has been afforded to the municipalities of presenting their views before an unbiased and impartial Committee of Parliament.

The statement was accompanied by three appendices, giving summaries of the two reports, and a list of the allied and subsidiary companies associated with the Newcastle-upon-Tyne Electric Supply Co., Ltd.

FOREIGN AND COLONIAL TARIFFS ON ELECTRICAL GOODS.

SOUTH AFRICA.—A decision has recently been given by the Commissioner of Customs as to the rate of import duty on voltoids for charging batteries. When imported in bulk the duty is 3 per cent. *ad val.*, a rebate of the whole duty being allowed on goods manufactured in the U.K. or reciprocating British Colonies. When imported not in bulk the duty is 20 per cent. *ad val.*, the rebate being 3 per cent.

The increases of Customs duties imposed in 1915 and re-imposed in 1916 and 1917—see ELECTRICAL REVIEW of December 21st last—have, with certain alterations, again been re-imposed, and will continue in force until June 30th, 1919.

SOUTH-WEST AFRICA PROTECTORATE.—The Customs duties for S. Africa referred to above, have, by Proclamation, been applied to, and are now operative in, the Protectorate of S.W. Africa.

SOUTHERN RHODESIA.—The following appear among recent decisions issued by the Customs authorities:—

	Duty under general tariff.	On goods the produce or manuf. of the U.K. and British Possessions
Bronze foil	3 % *ad val.*	Free.
Granulated lead ...	20 % „	9 % *ad val.*
Merrilite (zinc dust)	3 % „	Free.

TRINIDAD AND TOBAGO.—The revised Customs tariff of Trinidad and Tobago provides for the extension of the preferential rates of duty, which previously were restricted to goods originating in the U.K., Canada, or Newfoundland, so as to apply to goods

produced in any part of the Empire. Among the changes made in the new tariff may be noted the duty on machines and parts for electric lighting and power plant, which is now at the rate of 2 per cent. *ad val.* under the British preferential tariff and 2½ per cent. under the general tariff.

MALTA.—Increased import duties have been imposed by this year's revised tariff. Electrical goods now pay duty at the rate of 10 per cent. *ad val.*, while india-rubber and manufactures thereof pay 5 per cent. *ad val.* The new free list includes machinery for industrial purposes and parts thereof; also tin, copper, zinc, and lead in block and sheets.

BRITISH INDIA.—The revised import tariff valuations for 1918, upon which the duties leviable are based, include the following items of interest to the electrical industry :—

	Tariff valuation. Rs. A.	Duty.
Metallic ores, all sorts	*ad val.*	7½ %
Salammoniac	"	"
Telegraphic instruments and apparatus, and parts, imported by, or for, a railway company ...	"	2½ %
Electrical machinery, and component parts ...	"	"
Brass sheets, flat or in rolls, and sheathing weighing less than 1 lb. per sq. ft.; brass wire	"	7½ %
Copper, bolt and bar, rolled	"	"
" braziers, sheets, plates and sheathing (cwt.)	110 0	"
" nails and composition nails	*ad val.*	"
" old ... ... (cwt.)	65 0	"
" pigs, tiles, ingots, cakes, bricks, and slabs (cwt.)	95 0	"
" china, white, copperware ... ... (lb.)	2 4	"
" wire, including phosphor bronze and all other sorts of copper	*ad val.*	"
Lead, all sorts (except sheets for tea chests) ...	"	"
Quicksilver ... ... (lb.)	4 8	"
Tin (block) ... ... (cwt.)	155 0	"
" foil and other sorts	*ad val.*	"
Zinc or spelter, nails	"	"
" " " tiles or slabs, soft ... (cwt.)	50 0	"
" " " all other sorts	*ad val.*	"
Trade catalogues and advertising circulars ...	—	Free

CANADA.—An Order in Council provides for the payment of a drawback of 99 per cent. of the duties paid on imported materials used in the manufacture of wireless telegraph apparatus supplied to vessels in Canada subsequent to January 1st, 1918.

NEW PATENTS APPLIED FOR, 1918.

(NOT YET PUBLISHED.)

Compiled expressly for this journal by MESSRS. SEPTON-JONES, O'DELL AND STEPHENS (successors to W. P. Thompson & Co., of London), Chartered Patent Agents, 285, High Holborn, London, W.C. 1.

18,400. "Contact devices for ceiling roses, cut-outs, connectors, rosettes, and electrical fittings." H. B. PRENTICE. November 11th.

18,425. "Spring contact clips for replacement electric fuses." J. H. COLLIE. November 11th.

18,431. "Electric driving." S. G. JONES. November 11th.

18,433. "Electric arc lamps." H. B. GRYLLS & W. HEAPE. November 11th.

18,435. "Means for supporting electric cables, &c." J. R. HEWITSON, A. SIEMENS AND SIEMENS BROS. & Co. November 11th.

18,454. "Controllers for electric motors." H. C. WALKER. November 11th.

18,464. "Regulating devices for electrical machinery." Soc. ANON. DES ETABLISSEMENTS L. BLERIOT. November 11th. (France, July 31st.)

18,467. "Processes of electro-depositing magnesium." G. O. SEWARD. November 11th. (U.S.A., November 19th, 1917.)

18,468. "Circuits instantaneously sensitive to photo-electron action." F. TAVANI. November 11th.

18,500. "Electric heaters." A. H. GREEN. November 12th.

18,502. "Adapter or connector for electric wires." V. E. JOYCE & PARK ROYAL ENGINEERING WORKS. November 12th.

18,507. "Galvanic cells." G. W. PERRY AND SIEMENS BROS. & Co. November 12th.

18,511. "Telephone transmitter." J. SKINDERVIKEN. November 12th. (U.S.A., November 7th, 1917.)

18,517. "Sparking plugs for internal-combustion engines." L. HENRY AND R. MONNIER. November 12th.

18,534. "Alternating-current welding transformers." C. J. HOLSGAG. November 12th.

18,539. "Means for mounting electrodes in steam boilers, condensers, &c." A. S. GUSH. November 12th.

18,543. "Contact shoes for train-controlling systems." W. J. MELLERSH-JACKSON (E. P. Waterhouse). November 12th.

18,559. "Electric motor-control systems." BRITISH WESTINGHOUSE ELECTRIC & MANUFACTURING CO., W. BROOKE & L. MILLER. November 13th.

18,576. "Electric transformers." R. CROSSBIE-HILL. November 13th.

18,585. "Dynamo-electric machines." BRITISH WESTINGHOUSE ELECTRIC AND MANUFACTURING CO. November 13th. (U.S.A., November 23rd, 1917.)

18,590. "Attaching means for electric fixtures." F. D. PARMENTER. November 13th.

18,594. "Registration of telephone calls." W. H. GRINSTED, T. PETTIGREW AND SIEMENS BROS. & Co. November 13th.

19,601. "Electrical switches." H. J. DEAN-OSGOOD. November 13th.

18,614. "Inductance coils." H. A. EWEN. November 13th.

18,622. "Electric heating elements for radiator ovens." J. H. COUPE AND E. J. DOYLE. November 13th.

18,625. "Control and firing of mines, &c., by electricity." W. H. BRAGG, C. V. DRYSDALE & P. V. HUNTER. November 13th.

18,650. "Holders for incandescent electric lamps." F. QUARMBY. November 14th.

18,659. "Telephone transmitters." G. H. NASH & WESTERN ELECTRIC CO. November 14th.

18,660. "Instantaneous connector of electrical, &c., wire or wires." E. R. HEAFFORD & E. J. TILLEY. November 14th.

18,661. "Electric heating devices." H. H. BERRY & J. W. REID. November 14th.

18,669. "Chairs for electro-magnetic treatment of the human body." J. KRAUER. November 14th.

18,683. "Arrangement of electric generating groups for supplying equal number of electric motor groups." H. CROCHAT. November 14th. (France, November 14th, 1917.)

18,689. "Method of electric arc welding, cutting, and repairing." C. J. HOLSGAG. November 14th. (U.S.A., April 30th.)

18,700. "Electric switch box." G. H. SCHOLES. November 14th.

18,702. "Apparatus with horizontal diaphragm for electrolysis of alkaline chlorides." NORSK ALKALI AKTIESELSKABET. November 14th. (Norway, April 4th.)

18,703. "Electric magnetic lock-out switches." IGRANIC ELECTRIC CO. (Cutler-Hammer Manufacturing Co., U.S.A.) November 14th.

18,714. "Means for securing pole shoes of magneto machines." A. E. BENNETT AND BRITISH LIGHTING & IGNITION CO. November 14th.

18,715. "Armature windings of electric alternating-current machines." BRITISH LIGHTING & IGNITION CO. AND E. O. TURNER. November 14th.

18,716. "Winding armatures of magneto machines." BRITISH LIGHTING AND IGNITION CO. & E. O. TURNER. November 14th.

18,722. "Electrical sound-detecting devices." AUTOMATIC TELEPHONE MANUFACTURING CO. & J. B. REDFERN. November 15th.

18,740. "Electric switches or circuit interrupters." BRITISH WESTINGHOUSE ELECTRIC & MANUFACTURING CO. AND W. B. DALE. November 15th.

18,745. "Electrically-operated signalling devices." C. B. HARLOW. November 15th. (U.S.A., November 21st, 1917.)

18,746. "Moulds and method of casting grids for accumulator electrodes." H. F. JOEL. November 15th.

18,754. "Dynamo-electric machines." BRITISH THOMSON-HOUSTON CO. AND F. P. WHITTAKER. November 15th.

18,759. "Electrical heaters." C. R. ALLENSBY AND BENHAM & SONS. November 15th.

18,760. "Rotary electrical switches." E. L. RANKIN. November 15th.

18,764. "Electrical signalling apparatus for ships, &c." W. BURWELL, R. P. MYERS & E. ITTERSON-PRONES. November 15th.

18,780. "Electromagnetic lock-out switch." IGRANIC ELECTRIC CO. (Cutler-Hammer Manufacturing Co., U.S.A.) November 15th.

18,792. "Cooling electrical machines." A. ROLFE. November 15th.

18,802. "Electric switches." R. W. BELL. November 16th.

18,819. "Electrical heating elements." N. C. BARRETT & G. PATE. November 16th.

18,827. "Multi-speed alternating-current motors applicable to electric propulsion of ships, &c." BRITISH THOMSON-HOUSTON CO. (General Electric Co., U.S.A.) November 16th.

18,836. "Audion or lamp-relay or amplifying apparatus." M. LATOUR. November 16th. (France, November 17th, 1917.)

PUBLISHED SPECIFICATIONS.

The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1916.

9,543. APPARATUS FOR SIGNALLING BY MEANS OF LIGHT. Brodsky. June 30th, 1915. (Cognate application 11,423/15.)

10,187. REGULATION OF DYNAMO-ELECTRIC MACHINES. Remy Electric Co. December 19th, 1916. (112,415.)

1917.

13,527. DIRECT-CURRENT MACHINES AND SINGLE-PHASE MOTORS WITHOUT COMMUTATORS. O. Ligotti. September 20th, 1917. (120,062.)

13,692. ELECTRIC LAMPHOLDERS OR ATTACHMENTS. L. Bagguley & C. W. Lacey. September 24th, 1917. (120,064.)

14,412. APPARATUS AND METHOD FOR THE LOCALISATION OF FAULTS IN ELECTRICAL CONDUCTORS. J. E. Taylor. October 5th, 1917. (120,066.)

14,918. ELECTRIC LAMP FITTINGS. A. J. Bonnella. October 15th, 1917. (120,070.)

15,062. GAS, ELECTRIC, AND LIKE FIRES. W. B. MacLusky. October 17th, 1917. (120,073.)

15,111. BOXES AND SWITCHES OF ELECTRICAL FUSES. W. Donovan & G. O. Donovan. October 18th, 1917. (120,074.)

15,219. MEANS FOR SECURING ELECTRICAL FITTINGS TO CONDUIT OUTLET BOXES, PATRASSES AND THE LIKE. L. Milne. October 19th, 1917. (120,075.)

15,431. MEANS OR APPARATUS FOR COOLING AND VENTILATING ELECTRIC MOTORS AND DYNAMOS. E. Harris. October 24th, 1917. (Cognate application 2,120/18.) (120,083.)

15,635. ELECTRIC LIGHT APPARATUS. N. Papa. October 26th, 1917. (120,092.)

16,224. ELECTRIC HEATING AND COOKING APPARATUS. W. H. Bennett. November 7th, 1917. (120,108.)

16,398. SPARK PLUGS. F. Gerken. November 8th, 1917. (120,113.)

16,746. ELECTRICAL RELAYS FOR USE IN CANCELLING ARRANGEMENTS FOR ELECTRICAL SIGNALLING SYSTEMS AND OTHER PURPOSES. Sterling Telephone & Electric Co., F. G. Bell and W. C. Davey. November 14th, 1917. (120,119.)

18,115. TELEGRAPHY. E. S. Heurtley. December 6th, 1917. (120,135.)

18,494. ENGINE STARTERS. V. Bendix. December 13th, 1917. (120,138.)

1918.

2,561. INSULATORS FOR TELEGRAPH, TELEPHONE AND OTHER WIRES. Taylor, Tunnicliff & Co. and E. D. M. Scrivener. February 13th, 1918. (119,735.)

2,674. BUZZER SETS FOR LEARNING TELEGRAPHY. A. C. Brown. February 14th, 1918. (119,797.)

3,718. COUPLINGS OR CONNECTING DEVICES FOR ELECTRIC CIRCUITS. V. H. Broc. March 14th, 1917. (114,828.)

3,623. JOINTING OF ELECTRIC CABLES. W. J. Howard. March 1st, 1918. (119,984.)

4,125. CANCELLING MECHANISM FOR MINE-SIGNALLING SYSTEMS. Sterling Telephone & Electric Co., Ltd., F. G. Bell & W. C. Davey. March 8th, 1918. (Addition to 6,542/17.) (119,808.)

4,189. ELECTRIC PLUG CONNECTORS. H. Fairbrother (W. Ile). March 9th, 1918. (119,998.)

4,553. CONTROLLERS FOR ALTERNATING-CURRENT MOTORS. Igranic Electric Co. (Cutler-Hammer Manufacturing Co., U.S.A.) March 14th, 1918. (119,615.)

5,329. ELECTRICAL HEATING APPARATUS. C. Sorensen. March 26th, 1918. (119,822.)

5,420. AUTOGENERATING PORTABLE ELECTRIC LAMPS. V. Filippone. March 27th, 1918. (119,619.)

5,866. ELECTRODE HOLDERS FOR ELECTRIC FURNACES. Aktieselskab Arendal Smelteverk. April 13th, 1917. (114,841.)

6,110. MAGNETO-ELECTRIC MACHINES. G. Smith. April 10th, 1918. (120,167.)

6,641. ELECTRIC SWITCHES. W. Donovan & G. O. Donovan. October 18th, 1917. (Divided application on 15,111/17.) (119,627.)

6,642. ELECTRIC SWITCHES. W. Donovan & G. O. Donovan. October 18th, 1917. (Divided application on 15,111/17.) (119,628.)

6,896. FERRARIS RELAY FOR THE PROTECTION OF MULTI-PHASE MOTORS AND THE LIKE. R. J. Jensen. April 24th, 1917. (115,238.)

7,445. PILLAR INSULATORS. G. V. Twiss & Butlers, Ltd. May 3rd, 1918. (119,829.)